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ABSTRACT

Developed primarily as a source of information for teachers planning outdoor education experiences, the material in this resource book can be used by any teacher in environmental studies. Subjects and activities most often taught as part of the outdoor education program are outlined both as resource (basic information) and teaching units. The teaching units suggest pre-camp, camp, and post-camp activities, indicating materials required and procedures to follow for the activities. Topics include: insects, woodland community, shoreline ecology, weather, astronomy, stalking and observing, mapping and orienteering, creative arts, nature crafts, survival and campcrafts, water safety and recreation, and campfire programs. A bibliography accompanies each unit together with information specific to the outdoor education program of the Prince George's County public schools. (BL)

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O U T D O O R E D U C A T I O N

R E S O U R C E G U I D E

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SE 014 423

PUBLIC SCHOOLS OF PRINCE GEORGE'S COUNTY
UPPER MARLBORO, MARYLAND
Carl W. Hassel, Superintendent of Schools
1970

PHILOSOPHY OF OUTDOOR EDUCATION

The philosophy of outdoor education for Prince George's County is no different than the philosophy of the entire school system as stated in This We Believe. The goals set for each individual student are as important in the outdoor education situation as they are in the classroom. The only difference is the setting and to some extent the experiences. If more direct emphasis is placed on science and conservation principles in the outdoor education environment than in the school building, it is because this is the proper laboratory for many science experiments and the dramatics of conservation phenomena are all too obvious. The urgency for instruction in the latter is one of the most pressing demands upon education today.

OUTDOOR EDUCATION RESOURCE BOOK

This resource book is intended for use by any teacher who can utilize any of the material contained herein. Primarily it should serve as a source of information for a teacher who is planning an outdoor education experience for his or her class.

Several subjects and activities that are most often taught as part of the outdoor education program are outlined as resource, and as teaching units.

The utilization of these units or of any parts of these units is a matter of teacher preference. Activities other than those described may be incorporated in an outdoor education venture.

The material in this book has been prepared by teachers who have used it in their programs and who were most competent in their respective subject or activity areas.

EXPERIENCES IN OUTDOOR EDUCATION

Although Prince George's County is continuing to experience growth as a suburban area, several sources of outdoor education experiences are available. Many efforts are under way to increase the number of sites that can be reserved for outdoor education. These efforts require continued support and participation.

DAY FIELD TRIPS

1. Clinton Regional Park
2. Greenbelt Park
3. Watkins Regional Park
4. Oxon Hill Environmental Study Area
5. Ferguson Foundation

OVERNIGHT CAMPING

1. Camp Letts
2. Ferguson Foundation
   (When developed - site of the Prince George's County Outdoor Education School.)

OVERNIGHT CAMPING

at CAMP LETTS

GUIDELINES AND SUGGESTIONS

SOME DEFINITIONS

1. What are we talking about?

An overnight camping trip is a two-day -- one night trip to Camp Letts for the purpose of science and conservation study following classroom work on these subjects so that first-hand experiences may be gained by students.

2. When are they held?

These trips may be conducted at any time of year when facilities may be scheduled by your Outdoor Education Coordinator to coincide with classroom work.

3. Where are the trips held?

Most overnight trips are held at the YMCA Camp Letts facility at Edgewater, Maryland, one of the current operating sites of the Outdoor Education School. The lodge, used for cold weather trips, is heated and more within the "motel" rather than "rustic" category. Unheated cabins are available during suitable weather. Each holds 12 persons.

4. Who should participate?

Most programs of this type are limited to fifth and sixth grade students and above.

5. How many students should be involved?

Not more than one class of 30-32 students should make the trip at one time during cold weather months due to the space limitations in the lodge. At other times larger groups and more than one school may be accommodated if scheduling permits.

6. What costs are involved and how are they financed?

The cost of food and lodging for 32 students from each school has been paid by the Board of Education.

If a school is able to schedule more than 32 students (when using the cabins), then each additional pupil's cost is pro rated at $7.00 per. Thus, for example, is 34 students attend, a check for $14.00 made payable to YMCA Camp Letts should be submitted at time of arrival. Obviously, the additional amount should be borne by the school or the entire group and not by the 33rd and 34th pupils.

7. What about substitutes?

There are no provisions for substitute teachers in the budget of the Outdoor Education Program for overnight trips.

Possible means of covering classes for teachers participating include: large group programs for those students not attending, assistance from the area supervisor, and the use of parents and paraprofessionals according to the customary procedures of the local school.

8. Transportation?

Each school is responsible for making arrangements as with any field trip.

9. How many teachers should be involved?

In order to conduct an effective program there should be at least one teacher for every 16 youngsters overnight (preferably one male and one female to stay with the respective groups) and three or four teachers to work during the day with the class so that each instructional group is as small as possible.

If a school is unable to interest a sufficient number of staff members, the Outdoor Education Office should be consulted as limited provisions have been made for resource personnel.

10. Why go in the winter time or off-season?

Camping is often more exciting and rewarding at this time of year than during the customary season. Students can make a study of the winter landscape and contrast it with their usual experiences. The environment is often more conductive to introspection, contemplation, and friendship as more around-the-fire-against-the-elements activities are held.

SUGGESTED PROCEDURES

The following suggested procedures are concerned more with single class programs. When three or more schools are scheduled into camp on the same dates, group procedures and schedules are worked out with the staff.

1. Form a working committee of teachers who might be interested in participating and discussing the possibility of a trip - with the principal's assistance. Determine the resource personnel on the staff that may be available: physical education teacher, librarian, other classroom teachers who may be interested (even though their grade level is not participating), area helping teacher, art helping teacher, etc.

2. Contact the Outdoor Education Office, Mr. James Ruckert, Outdoor Education Specialist, and Mr. Warren Funk, Helping Teacher, at 627-4800 x 285; via Pony at the Outdoor Education School in the Kettering Elementary School if assistance is needed.

3. Determine the experiences that you wish to schedule for your trip - those areas that are being followed up from classroom activities. Some that have been successful (and are included in the Outdoor Education Resource Book):

a. insects
b. woodland community
c. weather
d. astronomy
e. shoreline ecology
f. stalking and observing
g. waterfront safety and recreation
h. mapping and orienteering
i. nature crafts
j. camp crafts
k. creative expression
l. camp fire activities

4. Decide on the scheduling of pre-camp activities so that the group will be well prepared by the time of the trip. The Outdoor Education Staff can recommend people to serve as resource personnel, provide bibliographies, and work with your students as much as possible. Teachers on your school staff need not feel especially qualified beyond their normal classroom instructional duties to be effective in an out-of-doors program.

5. Be sure that the following items have been clarified with the Outdoor Education Office:

   a. Resource Personnel
   b. Outdoor Education Staff Members if they are needed to assist with camp activities
   c. Materials that will be needed: (seining nets, compasses, and telescopes are available at camp. Other equipment must normally be furnished by the school).

6. Send letters to parents (see samples) and collect necessary funds and permission slips.

7. Assign students to study groups, bunks, and tables (for meals). Assign waitresses and those responsible for clean up at each table and explain their duties. Waitresses set tables (8-10 places) and carry food (served family style) as it is prepared in the kitchen.

8. Have students design and wear name tags.

SAFETY PRECAUTIONS

1. Unless specific arrangements are made with Mr. Ruckert, the Board of Education has <u>forbidden the use of canoes or boats and any swimming facilities</u> on overnight trips.

2. The docking facilities in front of the boat house are surrounded by deceptively deep water. Unless accompanied by qualified adults, no students should be allowed to enter this area. It is further suggested that all students should be restricted from all areas within 10 feet of shoreline at all times when not accompanied by teachers.

3. Although there is not a nurse on duty at the camp, a rescue squad and a physician are as nearby as might be found in the average school community.

SAME SCHEDULE

Date: First Day

9:15	Departure
10:00	Arrive at Camp Letts Organize personal belongings in assigned bunking areas
10:25	Assemble in lodge to go to study groups
10:30 - 12:00	Study Groups
12:00 - 12:50	Lunch (bag lunch provided by each student -- milk - by camp)
1:00 - 2:30	Study Group
2:30 - 3:10	Physical Education
3:10 - 3:30	Break
3:30 - 5:00	Study Groups
5:30 - 6:30	Dinner: announcements, student contributions, weather report
6:30 - 7:30	Supervised free play
7:30 - 8:15	Star Gazing
8:15 - 9:00	Around the fire - camp songs, skits, story about the out-of-doors by Bret Harte, Jack London, etc.
9:00 - 9:30	Snacks (provided by Camp)
9:30 - 10:00	Preparation for bed
10:00	Lights out

Date: Second Day

6:45	Rise and Shine
8:00	Breakfast
8:30 - 10:00	Study Groups
10:00 - 11:30	Study Groups
11:30 - 12:30	Physical Education
12:30 - 12:45	Prepare for Lunch
12:45 - 1:30	Lunch
1:30 - 3:00	Study Groups
3:00 - 3:30	Clean-up Study Group areas
3:30 - 4:00	Evaluation
4:00 - 4:30	Organize personal belongings for departure
*4:30	Depart
5:15	Arrive at school

*If late bus departure is unavailable, rescheduling may be necessary.

STUDY GROUPS

	10:30-12:00	1:00-2:30	3:30-5:00
Shoreline (teacher)	A	B	C
Nature Trail (teacher)	B	C	A
Art (teacher)	C	A	B

	8:00-9:30	9:30-11:00	1:30-3:00
Compass (teacher)	A	B	C
Poetry (teacher)	B	C	A
Insects (teacher)	C	A	B

CAMPING EQUIPMENT

Sleeping bag or bed roll
Old Army-type blanket
Pillow - if desired

PERSONAL ITEMS

Lightweight jacket or coat
Comfortable shoes (sneakers, for example)
Rain wear
Three pair of socks
Two pair of slacks
One sweater
Undergarments
Pajamas
Two towels and a washcloth
Toothbrush and paste
Soap
Comb and brush
Plastic cup or glass

ITEMS WHICH MIGHT BE USEFUL

Flashlight
Inexpensive camera and film
Sunglasses
Medication for sunburn
Insect repellent

NOT PERMITTED OR NEEDED

Radio
Food
Knife
Money

SAMPLE LETTER TO PARENTS

_____Elementary School

Dear Parents,

In coordination with our _____grade science program, an outdoor education experience will be offered to several students.

The site for our program will be Camp Letts, a YMCA camp, located on the Rhode River near Edgewater, Maryland. It is about a _____ minute drive from school.

It is hoped that a greater understanding of science and conservation concepts developed in the classroom will be achieved through first hand experience at camp.

The following items concerning the program will be of interest to you:

1. This will be an overnight experience.

2. Study groups will be directed by members of the _____(school)_____ staff.

3. An estimated fee of approximately $_____ will be charged to cover food (3 meals) and lodging.

You will find attachments to be signed and returned to the school.

Thanking you in advance for the support and cooperation which will make the program meaningful for your child, we remain,

Respectfully,

Outdoor Education Committee

_____Elementary School

CAMP LETTS PHONE:
932-8310

FLOOR PLAN OF LODGE

ENTRANCE

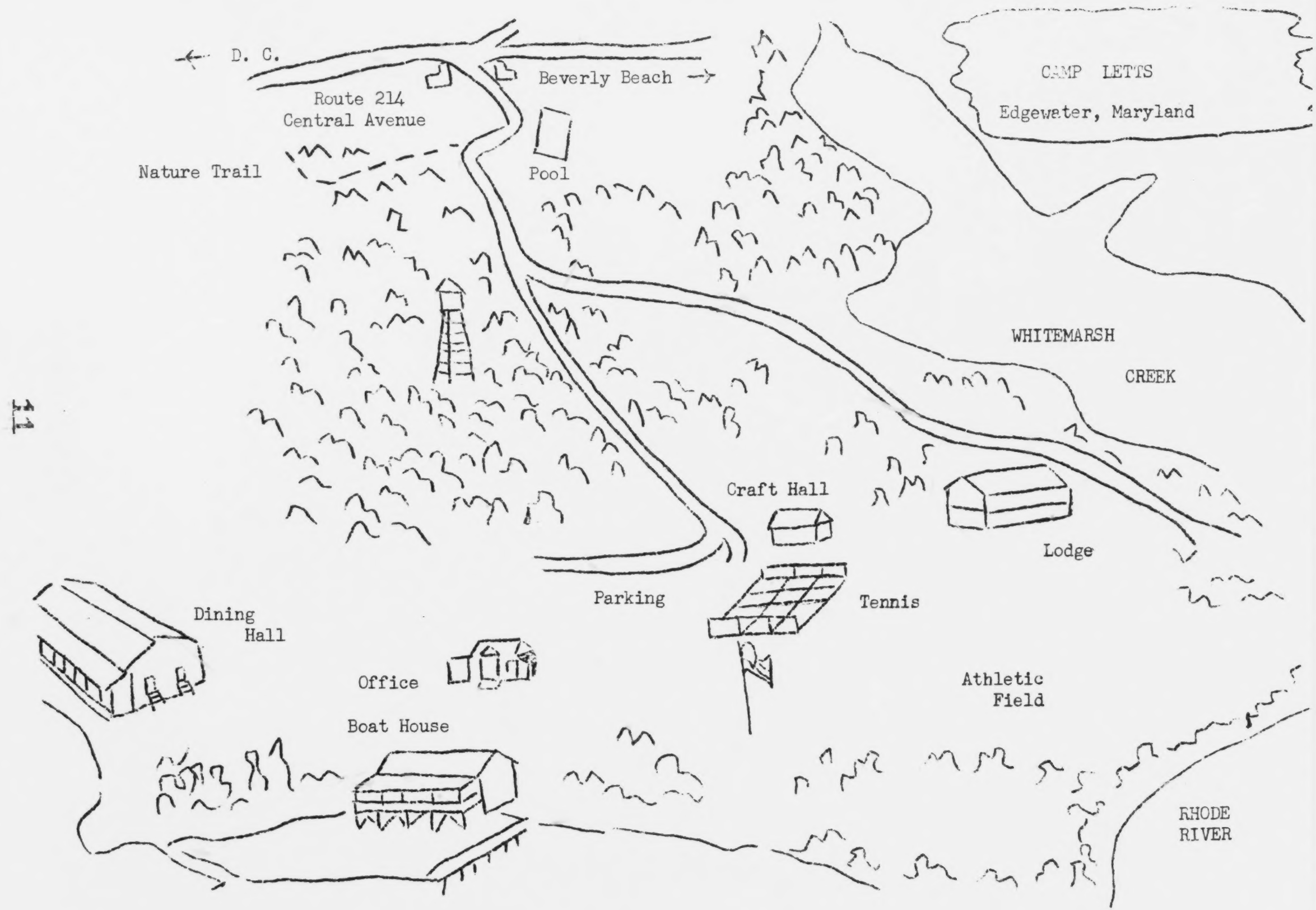
STORAGE	LOUNGE	FOYER	BATH	4 BEDS	4 BEDS

TOP FLOOR

STAFF 4 BEDS	STORAGE / BATH	4 BEDS	2 BEDS	4 BEDS	4 BEDS	4 BEDS

FURNACE		BATH	4 BEDS	4 BEDS
	MULTI-PURPOSE ROOM			
KITCHEN		4 BEDS	4 BEDS	4 BEDS

BOTTOM FLOOR


D. C.
Beverly Beach
Route 214
Central Avenue
Nature Trail
Pool
CAMP LETTS
Edgewater, Maryland
WHITEMARSH
CREEK
Craft Hall
Lodge
Parking
Tennis
Dining
Hall
Office
Boat House
Athletic
Field
RHODE
RIVER

OUTLINE FOR THE STUDY OF INSECTS

I. Purposes . . . . . p. 1

II. Scope and Sequence (The dimensions of the study of insects and the order of the steps to be taken.) . . . . . p. 1

III. Background Information (A study guide to the scope and sequence of the study of insects.) . . . . . p. 1

A. The Place of Insects in Nature-Web of Life . . . . . p. 2
B. Physical Characteristics . . . . . p. 4
C. Developmental Patterns . . . . . p. 10
D. Life Cycle . . . . . p. 10
E. Interesting Facts About Insects . . . . . p. 11

IV. Pre-Camp Activities . . . . . p. 12

V. Camp Activities . . . . . p. 14

VI. Post-Camp Activities . . . . . p. 17

VII. Bibliography . . . . . p. 18

I. Purposes

A. Increase understanding of the function of insects as they relate to the conservation of human and natural resources.

B. Develop awareness of the interaction between insects, plants, animals, and man.

C. Learn to recognize the basic physical characteristics of insects and observe how insects develop.

D. Increase confidence in working with insects.

II. Scope and Sequence

The amount of material to be covered in this area will have to be determined by the teacher. This is a suggested dimension in the study of insects with steps that should be considered.

Each school should provide the materials and equipment listed for suggested projects at camp.

A. The Place of Insects in Nature - Web of Life
   1. Insects and Plants
   2. Insects and Animals
   3. Insects and Man
      a. Value of insects
      b. Control of insects

B. Physical Characteristics of Insects
   1. Main body parts
   2. Specialized body parts (illustration)
   3. Function of specialized body parts
   4. Parts unique to specific insects
   5. Insect "relatives"
   6. Insect Orders

C. Developmental Patterns of Insects
   1. Complete metamorphosis
   2. Incomplete metamorphosis
      a. Simple development
      b. Direct development

D. The Life Cycle of Insects

E. Interesting Facts About Some Insects

III. Background Information

The class Insecta of the Arthropods may be identified by the following features: a jointed body composed of three divisions, the head, thorax, and abdomen; a pair of jointed legs on each of the three segments of the thorax for a total of six legs; two pairs of wings attached to the thorax, two kinds of eyes (simple and compound); one set of jaws; and one pair of antennae. The thorax can be thought of as the "motor room," containing the main muscles used for flying, walking, and swimming.

Some common insects appear to have segment for the thorax and abdomen (worm-like), but this is present only in the immature larva stage (caterpillars, grubs, etc.).

A. The place of Insects in Nature

Insects are a part of the web of life which includes everything that exists on earth, affecting plants, animals and man. Insects not only eat foliage and plant tissue, but also aid in fertilizing flowers. Thus insects help in producing fruit, flowers, and seeds. Germs which affect animals and man may be carried by insects, but the insects are in turn food for fish, birds, and mammals.

The relationship of insects with other forms of life has been a part of nature for millions of years. They were present in large numbers at least 200,000,000 years before man appeared.

1. Insects and Plants

Insects and Plants are interdependent. Plants afford food and shelter for insects. The insects, in turn, pollinate the flowers with specialized organs which collect the nectar and pollen. This interdependence is so important that without insects countless varieties of plants would become extinct.

Insects can be pests, threatening the existence of crops. This is most likely to occur when an insect has been imported to a region but its natural enemies have been left behind.

Some plants utilize insects as food, such as the Venus fly-trap, the pitcher plant, and the sundew.

2. Insects and Animals

Insects are the basic food source of many birds. Birds have a variety of ways to catch insects. Swallows and nighthawks eat mostly frying insects. Warblers and the brown creeper scout trunks, branches, and leaves of trees for scales, aphids, and other insects. The diet of most nesting land birds consists primarily of insects, consuming amounts equal to their own weight. If insects were not available, hundreds of birds would become extinct and gradually all birds would be eradicated.

Many mammals are insect eaters, such as the shrew, mole, skunk, bear, squirrels, mice, and others. The chief reptilian predators are lizards. The amphibians' first part of life is spent in fresh water where the aquatic insect is a primary source of food. Toads and frogs are almost completely dependent upon insects as food. Insects are a major part of the diet of fresh water fish. Spiders and scorpions prey upon insects, and mites are parasites of insects on their eggs.

3. Insects and Man

The relationship between insects and other forms of life has been a part of nature for millions of years. Insects can be either a friend or an enemy of man.

a. Value of Insects

1) Man has used insects to satisfy his own needs, bee's production of honey for food, the silkworm's silk-thread for fabrics, and the scale insect of India that secretes Lac from which shellac is made.

2) The existence of many plants is dependent on insects acting as pollen carriers. This is true of many plants used by man as Food.

b. Control of Insects

Insects eat products of value to man - corn, grain, vegetables, trees. Their appetites might also include clothing, books, furniture, and the wooden structure of houses. Some insects carry germs which cause disease.

1) Chemical insecticides are used to control insects found to be harmful to man. The control of insects by chemical means has been found to interfere with the natural relationship between insects and other forms of life. In destroying harmful insects, the insecticides are affecting and killing useful insects and birds. Then chemicals also seep into crops, thus affecting food.

2) Some efforts have been made to control insect pests by means of bacteria and fungi which cause diseases extremely distructive to insects. Results have been generally inconclusive, but in some cases highly successful. Contol of the Japanese beetle by bacterial disease has been very effective. Parasitic fungi commonly attact such insects as grasshoppers and chinch bugs. Little work has been done in this field, however, and artificial means increasing the effectiveness of these natural enemies must involve much more research.

3) Further control is gained through animals which eat insects, such as birds, snakes, frogs, toad and other insects.

Physical Characteristics of Insects

1. Main body parts

   a. Head
   b. Thorax
   c. Abdomen

THREE MAIN BODY PARTS (ANT)

Head

The antennae may act as the nose, ears, or directional sensors.

Thorax

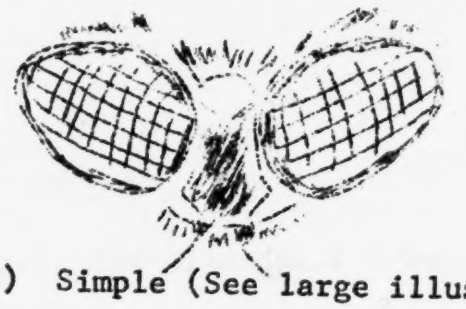
The thorax is the location for 3 pairs of legs of an insect.

Abdomen

This is the largest part of an insect. It contains the digestive, reproductive and excretory organs.

2. Specialized body parts of insects

   a. Eyes
      1) Compound eyes (housefly)



      2) Simple (See large illustration of grasshopper)

   b. Antennae - some insects use these as smellers, hearers, and steerers.

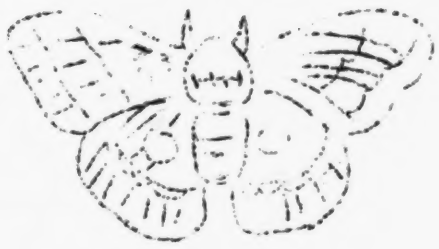
   c. Mouths - adapted to various tasks

Moth's Mouth
(sucking)

Mosquito's Mouth
(piercing and sucking)

d. Wings

Different Kinds of Insect Wings



Moth

True Fly

Beetle

e. Feet

Different Types of Insect Feet

Cicada Nymph
(digging)

Giant Water Bug
(holding)

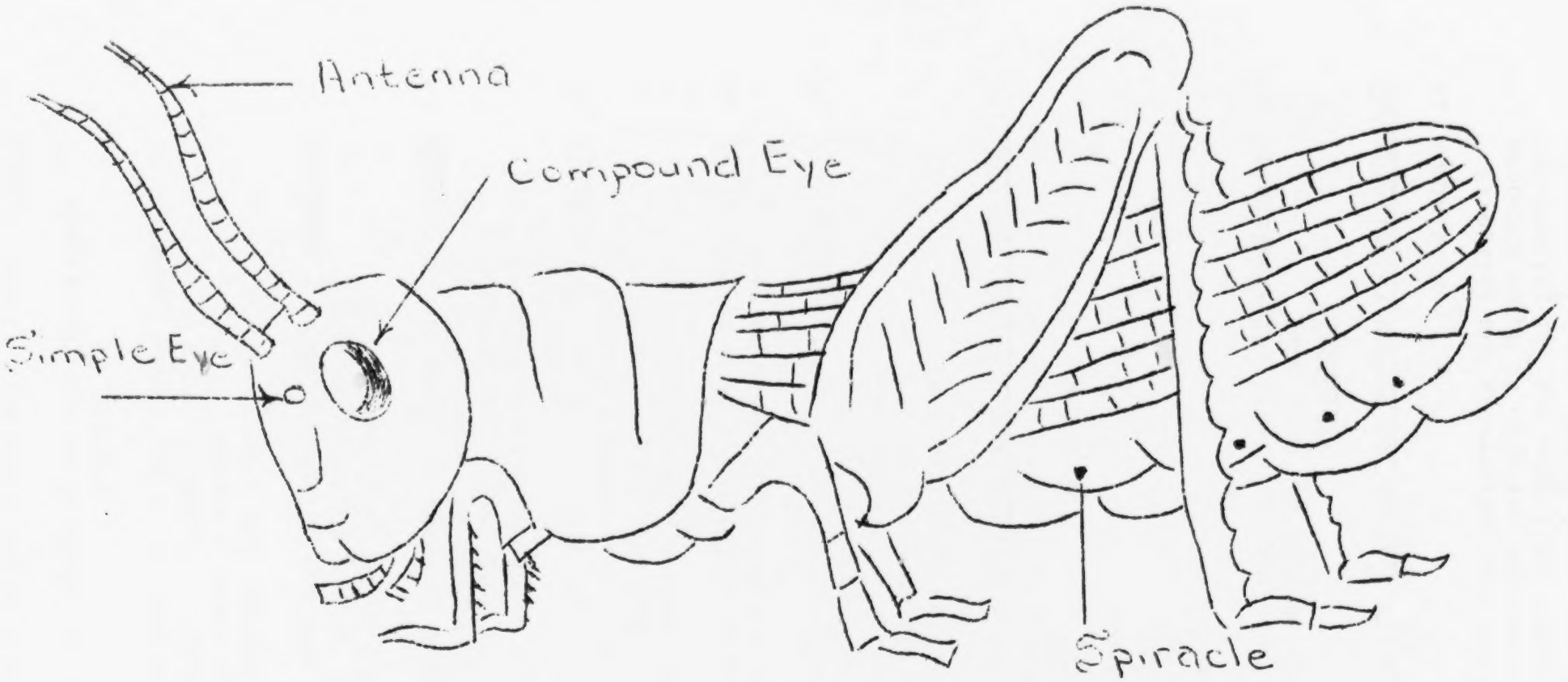
Wingless Hanging Fly
(hanging)

f. Jointed Legs

g. External skeletons, formed of a tough material that contains a substance called chitin.

In order to grow, the insect has to shed its hard outer skeleton from time to time and grow a new and larger one. This process is called molting.

AN ADULT INSECT
(Grasshopper)



OUTSIDE PARTS OF AN INSECT

An Adult Insect's Main Body Parts:

- Six legs
- Three main body parts
  (head, thorax, and abdomen)

- Head has a pair of antennae, two kinds of eyes - simple and compound
- Thorax, the "motor room", has wings attached, two legs attached to each section
- Abdomen contains digestive, reproductive and excretory organs. Spiracles on abdomen allow air to pass from the outside of the body through tubes called Tracheae. It is the insects breathing mechanism.

3. Function of specialized body parts

a. Eyes - insects have two types of eyes

1) simple eyes - seem to serve as stimulating organs without actual vision.

2) compound eyes - can be focused to view objects near or at a distance, similar to an automatic-focus camera. However, these eyes apparently perceive motion more than actual objects.

b. Antennae - sometimes called feelers, used to feel vibrations or as a nose to detect odors. (A moth can fly miles by using his antennae to follow scent trails.)

c. Mouth - may be used for sucking, such as with the butterfly which sucks up nectar as one would fill a fountain pen. Cockroaches, ants, etc. chew their food. Blood sucking insects pierce the skin and sucks the blood.

d. Wings - used for flying, but differently from the bird. Insect wings are whirred very rapidly, hundreds of times a second, forming a figure eight in the air. The male cricket uses the structure of his wings to produce the chirping.

e. Feet - may be used for walking upside down, such as by flies and bees on a ceiling. Their feet have hooks and sticky pads.

f. Jointed legs - aid in movement. The legs of water beetles are fringed with stiff hairs that act as excellent oars. Dragonfly legs are held together to form a basket which is used to scoop up its insect prey (in a fashion similar to a butterfly net).

g. External skeleton and covering - the outside covering of most insects is a tough, flexible, waterproof material that encloses the insect into a "suit of armor" and forms his outside skeleton. Various types of hair are joined to this outer covering, especially noticeable in butterflies and moths.

h. Spiracles - The breathing apparatus of insects. They allow air to pass into the body of the insect through tubes called Tracheae.

4. Characteristics unique to specific insects

a. Luminescence

Fireflies and glow-worms, and click-beetles have a light-giving property which is of great interest to scientists. It is especially interesting in that very little heat accompanies this light production, giving a "cold" light that is most unusual. This light may seem both to attract members of the species to one another, and to warn other insects to get out of the way.

b. Stingers

Most members of the insect order Hymenoptera (bees, wasps, ants) have an organ for stinging. Glands in the insect secrete a venom which is ejected through the ovipositor and is used as a defense, serving to paralyze or kill prey.

c. Mimicry

Mimicry is the development of an advantageous resemblance of a vulnerable insect to one which is disliked or feared. This affords much protection to a species. Mimicry may be in color, sound, or motion. The butterfly and moth can flutter to the ground like a falling leaf; the caterpillar may resemble a part of the twig.

5. Insect "relatives"

Many insect-like animals are confused with insects. To restate the classification in simplest terms insects have six legs and a jointed body of three parts (i.e. head, thorax, abdomen). Some creatures frequently referred to in error as insects are: Arachnides (spiders) divisions, eight legs, no true jaws; crustaceans (crayfish, water flea, barnacle) usually four or more pairs of legs, breathe by gills (sometimes called "insects of the sea"); centipedes and millipedes - many-segmented bodies with legs on each segment.

Among the mistaken insects are ticks, mites, scorpions, chiggers, lice, and sowbugs (woodlouse).

MAJOR ORDERS OF INSECTS

CLASS	NAME OF ORDER	PREFIX	STEM	MEANING	COMMON EXAMPLES	WINGS, MOUTHPARTS
INSECTA	Orthoptera	Orthos	ptera	Straight wings	grasshoppers, crickets	2 pairs of wings or wingless; chewing
	Lepidoptera	Lepido	ptera	Scale wings	moths, butterflies	2 pairs of wings; chewing (larvae) sucking (adults)
	Hymenoptera	Hymen	ptera	Membrane wings	wasps, bee, ants	2 pairs of wings or wingless; chewing
	Coleoptera	Coleos	ptera	Sheath wings	beetles, weevils	2 pairs of wings or wingless; chewing
	Hemiptera	Hemi	ptera	Half wings	bedbugs, chinch bugs, squash bugs	wingless; piercing-sucking
	Homoptera	Homos	ptera	same Homogenous wings	aphids, scales plant lice	2 pairs of wings or wingless; piercing-sucking
	Diptera	Dis	ptera	Two wings	flies, gnats, mosquitoes, flies, gnats	1 pair of wings; chewing (larvae); pierce-sucking adults

C. Developmental Patterns of Insects

Growth patterns follow different stages as determined by the species of insect.

1. A butterfly develops in four separate stages, which is called a <u>complete metamorphosis</u> consisting of:

   a. <u>Egg</u>
   b. <u>Larva</u> or caterpillar stage
   c. <u>Pupa</u> (resting) stage
   d. <u>Adult</u> emerges from pupa

COMPLETE METAMORPHOSIS

Example: Butterfly

Egg Larva Pupa Adult

2. <u>Incomplete metamorphosis</u> is fewer than four stages of development.

   a. Simple development - three stages of the dragonfly:

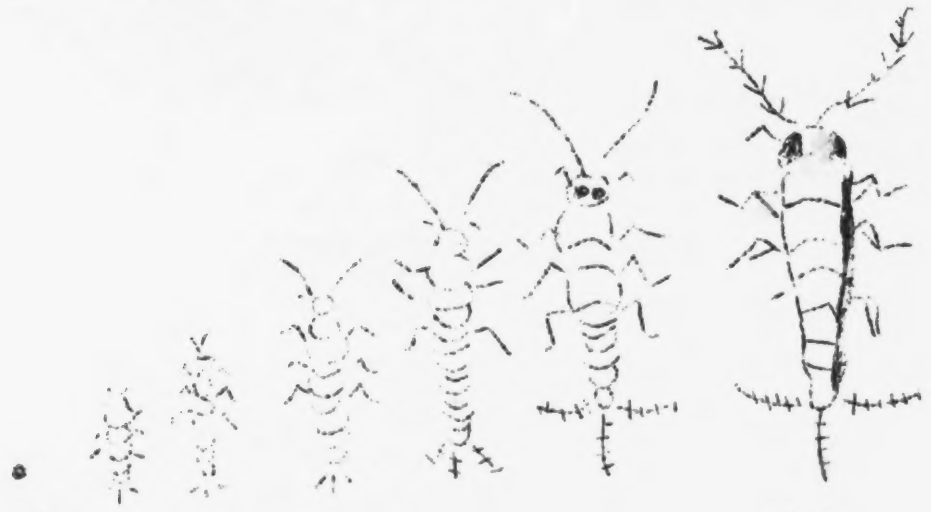
      1) Egg
      2) Underwater nymph
      3) Adult

eggs nymph adult

b. Direct development occurs in two stages as in the silverfish:

1) Eggs are deposited in the ground in autumn
2) Insect hatches out the following spring

Direct Development



egg adult

3. Interesting Facts About Insects

Yellowjackets and wasps were the world's first papermakers. They build their nests out of paper they make themselves.

Some ants stuff themselves with honey, then hand from the top of a tunnel so that ants passing beneath them can reach up to get a drink of honey from this "living honeypot".

A bee can fly with bags of pollen on its legs that are as heavy to the bee as a big sack of potatoes would be to a person.

Ants keep "cows" called aphids, from which they get a milky substance.

Once there were giant dragonflies with wings that spread wider than a person can stretch his arms.

A butterfly has a long tube for sucking nectar that it can curl up when it isn't eating.

Liquid for ink can be gotten from the gallnuts made by gallflies.

Bread flour is made from grasshoppers in Arabia.

Katydids have their ears on their forelegs, just below their "knees".

Queen ants have been known to live as long as fifteen years.

Fleas can be taught to pull tiny wagons and do other tricks.

Hornets can fly fifteen miles an hour.

The sphinx moth has been clocked at flying thirty-three miles an hour.

Some insects fly backward - the hawkmoth, dragonfly, and others.

Many insects are orphans, as most of the female insects die after producing their eggs - mayfly, grasshopper, etc.

The drone fly beats its wings 300 times a second.

The Smyrna fig is sometimes called a fruit without a flower. However, the inside of each fruit has several hundred tiny flowers. An opening at the top of the fruit permits a small wasp to enter and pollinate the flowers.

IV. Pre-Camp Activities

A. The teacher and class may do research and discuss their findings about general characteristics of insects. Research might consist of picture study; collecting pictures from magazines; sharing and listing names of books on insects and viewing films, filmstrips, SVE pictures of insects.

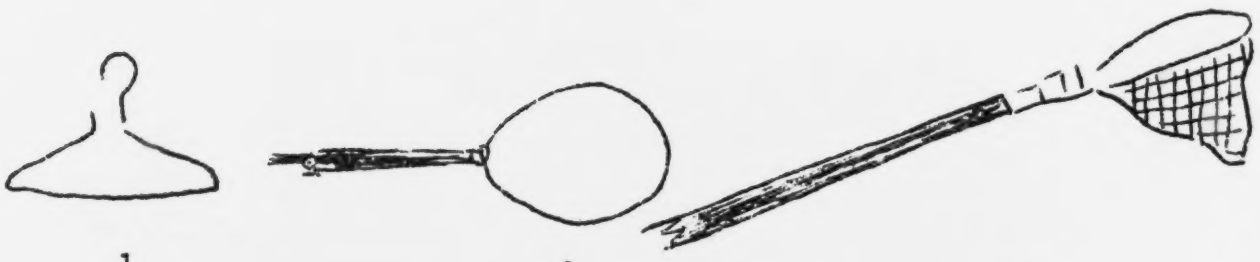
B. Suggested STUDENT PROJECTS

(The students may wish to do one or two of the following projects.)

Insect Nets

Materials - coat hanger, broom handle or other such stick, cheese cloth, needle and thread

Procedure - (1) Bend wire into circle, leaving the two ends sticking out 8 to 10 inches.
(2) Secure the two sides ends to a light, strong stick about 3 or 4 feet long.
(3) Sew a double layer of cheese cloth into the shape of a bag. Attach the net to the wire.



1. 2. 3.

Killing Jar

Materials - screw top jar with lid, plaster of Paris, Alcohol

Procedure - Plaster of paris mixture is poured into jar to form a layer about one inch thick. After the mixture has dried, some alcohol is poured into the jar and allowed to remain there for several hours. The plaster of paris will soak up some of the alcohol. Excess fluid is poured out, a piece of cardboard laid on top of plaster of paris, and the top replaced on the jar. Renew the jar, remove the cardboard and add more alcohol.

Relaxing Jar

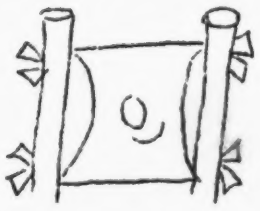
Materials - jar, moth crystals, sand, water

Procedure - In a jar mix sand and moth crystals about 3/4 inch deep. Moisten with water. Add a piece of cardboard to keep your speciman dry. This relaxes your speciman for easy mounting.

*Night Collecting Sheet Trap

Materials - a sheet, 2 poles or 2 trees, and a strong light as fluorescent as possible

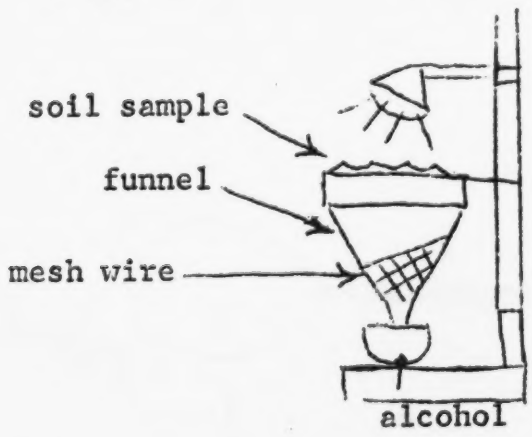
Procedure - Stretch a sheet between two poles or trees. Set a strong light directly behind the sheet. The light will attract the insects and they will cling to the sheet. The students can pick them from the sheet or scoop them into vials at the bottom of the sheet.



*Sampling Soil For Insects

Materials - soil sample, alcohol, large funnel, sun lamp or strong bulb, wood or metal to construct frame, and ¼" wire mesh

Procedure - Soil sample is placed in the funnel. A large light is placed above the soil. The container of alcohol is placed beneath the funnel. The heat from the bulb drives the insects down through the funnel into the alcohol trap. The insects can be collected from the trap.



*Can be performed at camp if you bring materials with you. You will also want to bring insect net killing jar, relaxing jar and materials for Collecting Sheet, and soil sampling device.

V. Camp Activities

A. Collect insects during a hike through the camp area. They should note environment where insect was caught (open field, under rocks, along shoveline, etc.).

B. Collect insects using the sheet trap idea (explained under pre-camp activities.).

C. Collect insects by painting a tree with a mixture of beer and fermented fruit juice. (Works best at night.)

D. If the weather is cold, you can collect insects by sampling Soil for Insects.(explained under pre-camp activities.)

E. Examine and view insect finds under various types of magnification ranging from the bioscope to the simple tripod magnifier. (Teachers must bring the equipment from their own school.)

F. Preserve your specimen in slide form (Insect Blister Slides), life story collections or dry mounts.

1. Insect Blister Slides

Materials - blister slides, water container, tweezers, eye dropper, clear Karo syrup, killingjar

Procedure - Insects, if not dead, are placed in the killing jar. When dead they are washed off and carefully picked up with the tweezers and placed in the center of the well of a Blister slide of the proper dimensions. Karo syrup is poured into the well of the slide, being careful not to spill or allow to run over, and trying to avoid air bubbles. The insect is pushed to the center of the slide, and the cover is carefully closed. After the slide is washed off, it may be placed under the microscope for observation. Slides prepared in this manner will last a long time.

2 Life Story Set

Materials - pins, box, small bottle, samples as illustrated

Procedure - (Mounting all stages of development for a specific insect into a life history set makes an especially valuable collection.) Select an insect such as a butterfly. The eggs, pupa, and adult can be pinned to the bottom of a box. The larva stage is best preserved in a small bottle in rubbing alcohol solution; it will discolor, but this seems unavoidable. It would also be interesting to mount a piece of the plant on which the larva (caterpillar) stage was found.

3. Dry Mount

Materials - straight pins, small labels, display box

Procedure - Push a rust-proof pin (number 1 or 2) about three-quarters of the way through the thorax. Attach a small label to the pin which gives name of the insect, date and place where caught. The insect is now ready to be placed in some kind of display box. The box should be as airtight as possible to prevent mold. Moth crystals can be added to keep out small insect pests that might eat the mounted insect specimens. A layer of corrugated cardboard in the bottom of a cigar box will hold pin mounts and make a good display box.

G. Insects can be identified. (Remove books for insect identification must be brought from school.)

H. Insects can be identified by the sounds they produce. A portable tape recorder can be used to record the sounds of insects and bring them back for identification.

I. Collect spider webs. Spray the web with paint (gold, silver and white work well) while it is still attached to its source. Bring a sheet of black construction paper under the web. Spray with clear plastic. Cut strans that hold web in place and you have your preserved spider web.

J. Estimate temperature by counting cricket chirps. Count the number of chirps in fifteen seconds and add 39. Compare your results with a thermometer.

K. Look for dragonfly nymphs. (Found along the shoreline in the vegetation.)

L. Note and list the kinds of covering found on insects. Make the list from your specimens.

M. Sketch a variety of insects and mount them for a wall collection at school.

N. Collect and decorate stones to resemble real insects or imaginary ones.

O. Collect and keep insect pets. (Junebug, Ladybug, Ant Lion, Grasshopper, Cricket, Walking Stick, Preying Mortis)

P. Set up Interest Centers in your classroom on insects.

Q. Have an Insect Scavenger hunt.

R. Conduct relay races where locomotion must imitate insect.

S. Observation Lotto: Each person is given a card similar to the one shown here. On seeing an object or insect which is on his card, he may put an X in the appropriate square. The first to fill in a row vertically or diagonally wins. Second and third places may be competed for by those still playing the game.

mosquito	ant hill	wasp's nest	red ant
bumble bee	dragonfly	cocoon	honey bee
horse fly	insect gall on leaf	Japanese beetle	leaf chewed by insect
spider's web	moth	monarch butterfly	grass-hopper

VI. Post-Camp Activities

A. The teacher may wish to extend the activities begun at camp (collecting, preserving) since time at camp is limited.

B. Individual students or a class may wish to continue or add to their insect collection throughout the year.

C. Students or a class may wish to start a life history set of insects that can be found in the area of the school-community.

D. Listen to the recording of insects taped during the stay at camp. Identify insects or woodland creatures, by their sounds.

E. Do research on the cost of maintaining control of insect pests.

F. Visit or have a resource person talk to the class about bees, insect control, or other areas of interest concerning insects.

G. Obtain a kit of honeybees that can be observed by the class. (Contact the Elementary Science Department for details.

H. Observe insect life in the classroom via terrarium, insect zoo, etc.

I. Obtain an ant farm for classroom oberservation. (commercial or self-made)

J. Obtain literature about insects for recreation.

K. View movies and filmstrips about insects.

L. Collect and keep insect pets.

VII. Bibliography

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340	Insect Zoo	11 min.	color
684	Insect Collecting	14 min.	color
1018	Big Green Caterpillar	11 min.	color
1378	Biography of a Bee	15 min.	color

Picture Sets

W-57 Common Insects (Materials Center) Groups A, B, and C of Insect Prints, "My Weekly Reader Science Pictures", Davis, Delaney Inc., New York 1966.

Filmstrips

Learning About Insects. Encyclopedia Britannica
Metamorphosis of Moths and Butterflies. Encyclopedia Britannica
Life in a Fallen Log. Modern Biology Series - SVE

Tapes

T-395 Ants and Bees
T-396 Bees and Wasps
T-579 Mischievious Mosquito

OUTLINE FOR THE STUDY OF THE WOODLAND COMMUNITY

I. Purposes . . . . . p. 1

II. Scope and Sequence . . . . . p. 1

III. Background Information

A. Web of Life . . . . . p. 2

B. Environmental characteristics of a Woodland Community . . . . . p. 3

C. Life forms in a woodland community . . . . . p. 7

1. Plant Life . . . . . p. 7

2. Animal Life . . . . . p. 30

D. Conservation . . . . . p. 45

E. Interesting facts about the Woodland Community . . . . . p. 49

IV. Pre-Camp Activities . . . . . p. 51

V. Camp Activities . . . . . p. 53

VI. Post Camp Activities . . . . . p. 54

VII. Games . . . . . p. 58

VIII. Bibliography . . . . . p. 62

IX. Camp Letts Nature Trail . . . . . p. 66

I. The objectives of the program are to:

A. Study plants, animals and birds as elements of the woodland ecology in order to understand their interrelationships.

B. Explore and observe the seasonal changes of nature in order to understand how plants and animals adapt to these changes.

C. Learn to locate and identify members of the woodland community.

D. Gain understanding of the numerous cycles in operation in a forest.

E. Examine and realize the importance of the woodland community to the welfare of man.

F. Learn what measures are needed to protect and maintain the habitats necessary for animals and plants to survive in their natural state.

G. Learn how man can provide special services for the woodland community during periods of drought, disease, fire or floods.

II. Scope and Sequence

The amount of material to be covered in this area will have to be determined by the teacher. This is a suggested dimension in the study of the inhabitants of a woodland community with steps that should be considered.

Your school should provide the materials and equipment listed for suggested projects at camp.

A. Web of Life

B. Environmental characteristics of a woodland community

1. Rock
2. Soil
3. Water
4. Climate

C. Life forms in a woodland community.

1. Plant life
   a. Simple plants
   b. Transitional plants
   c. Complex plants
      1) Trees
      2) Wildflowers
2. Animal life
   a. Amphibians
   b. Reptiles
   c. Mammals
   d. Birds
   e. Insects
   f. Worms

D. Conservation

1. Soil conservation
2. Water conservation
3. Forest conservation
4. Wildlife conservation

E. Interesting facts about the woodland community.

III. A. Web of life in a woodland community.

If you want to be where the action is, go into a woodland community. Of course, you will need to "tune in" with all your senses to be aware of the action because you are an "outsider."

You may be sure that your presence has been noted and that many eyes are upon you. The vibration from your heavy footfall has caused many creatures to scurry to safety. Your rank odor has warned others. Your noisy approach has signaled the keen of hearing. The reflection from your clothing may have caught a watchful eye as has any movement of your body.

What is going on there? Struggles for life; competition for territory; death throes; beautiful music; manufacturing; decaying; new life aborning; schooling of young by their parents; urgent searches for food; gas escaping; continuous operation of cycles that may be more important to you than you realize.

All around you are cleverly concealed homes. Many inhabitants are demurely colored and cunningly blended with their surroundings so that they are often unseen even by the searching eyes of their enemies. Other community members are gaudily robed to call attention to themselves. Thus their territorial rights are conspicuously proclaimed.

Under your feet is the material that sustains life itself. Forests are great producers of soil. They are preservers of it, too. Water is released in a forest, but it is also trapped there and channeled into storage areas underground.

The oxygen for your next breath was released by the green plants around you. Only green plants can produce food for all the creatures of the land from the life-sustaining soil and the sunshine filtering down to you.

Forests act as windbreaks and influence the flow of rivers.

RESPECT A WOODLAND

The web of life is complex beyond believing and important beyond understanding. It takes four hundred years for a forest to reach maturity, but its destruction can be precipitated by an instant of carelessness or one act of greed.

B. Environmental characteristics of a woodland community.

1. Rock

The crust of the earth is composed of rock, which is solid mineral matter. Underlying bedrock breaks down to gradually form a part of the soil cover. This breakdown occurs somewhat faster in a woodland area than in other areas because of the plant cover. Decaying plant tissues supply an acid which is utilized in breaking down the rock.

Nearly all rocks are formed by one of three processes:

a. Igneous rock such as granite and basalt are formed when molten lava cools and solidifies.

b. Sedimentary rocks such as sandstone, mudstone, clay, chalk and shale are formed by pressure. Fragments of older rock, bits of animal shell and other materials are washed from higher lands to plains where they accumulate in layers. As the layers build up, pressure and the heat energy released fuse the mass into rock. Such rocks are much less dense than either igneous or metamorphic rock and thus not as hard. Pieces can sometimes be crumbled in your hand.

c. Metamorphic rock results when sedimentary rock and other materials are carried into the depths of the earth, perhaps during upheavals in earthquakes. The intense heat and pressure existing at these depths alter the rock.

In the woodland community rock piles may serve as animal dens. Some animals prefer to tunnel under large rocks. Since rocks shade the area beneath them, insects may prefer the cooler, moister area there. Turn up some rocks to see what you can find.

2. Soil

Soil is the end product of decayed plants and animals and decomposed rock. Nature requires from four hundred to a thousand years to manufacture one inch of topsoil. The decayed plants and animals form what is called humus in soil. The life which soil can support depends on the thickness and richness of the humus layer. The water and nutrients that are available to plant life will be modified by soil conditions. The value of soil is measured by moisture, acidity and nutrients. These characteristics will determine what native vegetation will survive, and what methods man must adopt in using the managing soils (such as crop production). Soils develop best in warm, humid climates which are favorable to plant growth and, in turn, to the breakdown of bedrock (see above).

Plants vary widely in their tolerance of soil conditions. A black soil is rich in humus; red and yellow soils are low in organic matter; soils with poor drainage tend to be gray. The soil texture may be sand, clay, or loam. The physical makeup of soils has "a controlling influence on chemical reactions and biological processes." (Ency, Britannica) The soil provides a medium for root development and supplies nutrients for plant growth; most plant nutrient materials are absorbed through the root system.

Soils have a variable ability to hold water, losing it both by evaporation and runoff. This, in turn, can cause a loss of nutrients. There may also be a high chemical fertility, but a lack of moisture, which makes the nutrients inaccessible to plant life.

Soil temperature varies with the moisture content of the soil. Wet soils are colder than dry ones, therefore slower to warm up in the spring. A soil with a plant covering will remain warmer in the winter. A bare soil heats more rapidly. Soils also have differing natural ventilation: sand soils need to be compacted; clay soils need to be aerated.

Soil is full of life. The presence of many microorganisms such as bacteria, fungi, and algae have a marked effect on the productivity of soils. Soil organisms decompose organic matter. There are many animal inhabitants of the soil. These are mainly invertebrates such as slugs and snails, earthworms, millipedes, spiders, and insects. There are also some burrowing vertebrates such as woodchucks, mice, moles, and lizards. They are very valuable in the aeration provided by their activities.

3. Water

More water is present in the body of plants and animals than any other substance; the blood of man and the sap of plants are primarily water. Thus water is essential in the nutrition of man and plants alike. Water carries nutrients through the host body and disposes of wastes; it also regulates temperature, acting as a cooling agent.

Water occurs in three forms: a solid, as snow or ice; a liquid, as water; in gaseous form, as steam. Water is always present in the air as water vapor.

Water is accessible from three main sources:

1) Rain water;
2) Surface water (streams, ponds, lakes); and
3) Ground water (natural springs, wells). Water is not supplied continuously and the effects of this are obvious in drought/food cycles. The form in which water is received is important. Snow may accumulate for a long time, then fun off quickly in a few periods of very low water level. Evenly distributed precipitation provides an even water supply. Thus the amount of water available at any given time is determined by the form in which the water is received, the amount precipitated at any one time, and the distribution of precipitation over a given time span. Water moves in a "Hydrologic Cycle." (See illustration)

Where rainfall tends to be seasonal it may come at the wrong time of year to do any good for the development of plant life. The forms of life supported in a given region are those which adapt to the average conditions or precipitation (and temperature). Plants which are considered characteristic of a given area will disappear if there is a marked change in climatic conditions.

Plant cover will make a difference in soil moisture. Plants shade the soil, thus cutting down the amount of water lost to evaporation. The richest soil development occurs where there is high humidity (that is, a lot of natural moisture in the air).

Too much moisture can greatly alter the life sustained in a given area. Wet soil is generally poorly ventilated, which reduces or eliminates soil-living animals and makes root penetration difficult. Soils in areas of high rainfall are also likely to be deficient in nutrients which the plants require, as these are washed out by the constant movement of water.

Temperature has been called the greatest climatic influence. A difference of ten degrees may mean the absence or presence of any given plant; the more efficient species will keep out species whose adaptation is less efficient. Temperature affects water evaporation, transpiration, rate of photosynthesis, and other activities of the plant cell. Some plants require a high temperature and others require a low temperature, particularly at night.

Every plant requires a growing season where temperatures are above freezing. This may range from a few days in polar regions when tiny alpine plants will come into bloom, to a frost-free period of 14-16 weeks that is required by most trees. Plants adapt to cold by becoming dormant.

Animal life is also affected by temperature. A climate of suitable temperature may support a parasite that will exterminate a particular species of plant life. The best furbearing animals are native to cool climates.

The abundance of plant and animal life is obvious in the spring and summer, with all manner of plant and animal life visible whichever way you turn. Our winters appear rather barren, but close observation of a woodland setting will continue to reveal much life. The tracks of mice, rabbit, deer, and birds in the snow show us that much life is still active in our Maryland winters. The temperature extreme is not severe enough to drive out all active life.

Maryland falls into a region where growth is classified as "temperature deciduous forest," with a well-distributed annual rainfall and a well-defined winter and summer. Life is not limited to just a few varieties, but occurs as a great multitude of species.

C. Life forms in a woodland community

1. Plant life

Plants have been placed in four general classifications from the lowest to the highest in the plant kingdom:

Thallophyta: alga and fungi have no leaves, roots or stems
Bryophyta: liverworts and mosses
Pteridophyta: ferns
Spermatophyta: seed bearers

(The first two groups are presented together as simple plants in this book.)

Plants reproduce in three different ways or in combinations of these:

Vegetative - A part which is broken off can grow into another full plant as potato eyes, cutlings, leaves of violets, and others

Asexual - Only one "parent" is required in the reproduction of spores; each spore is capable of becoming a new plant. (i.e. mushrooms)

Sexual - A sperm cell and an egg cell must unite

Plants are alike in some aspects:

They are incapable of voluntary movement and are unable to change their present location.

Green plants are equipped to manufacture their own food, while non-green plants live on ready-made food of either living or dead green plants or on animals living or dead.

Plants vary in their life cycles and in adaptation to seasonal weather variations.

Annuals - are plants that live for one growing season only. Occasionally "volunteers" come up the second year when seeds have nestled in the ground and lived through the freezing weather

Biennials - form leaves, flower and die the second year.

Perennials - form leaves, flowers and fruit each year for several years.

Some plants have very long life spans. For example, some redwood trees are believed to be 4000 to 5000 years old. The Joshua trees and bristle cone pine trees are even older since some specimen still living are known to be over 6000 years old.

All life is sustained by plants because green plants produce all the food of the world through the process of photosynthesis.

Through the oxygen, carbon dioxide cycle plants replenish the oxygen supply vital to animal life. This is especially important to us since air pollution is a serious problem and because of the population explosion. Man cuts his odds on survival when he cuts acres and acres of forests and covers millions of square miles with blacktop-thus cutting down on the green areas from which his essential oxygen supply comes.

Forests are an essential part of watersheds. Decaying plant life, particularly tree leaves, on the forest floor cause the area to act as a sponge soaking up millions of gallons of water and thus prevent rapid runoff. Roots help hold soil in place. When you look at a tree, try to realize that there is a root system under ground that nearly duplicates the crown of the tree in size and complexity. The trillions of leaves in a forest trap millions of barrels of water and let it drip down gently and seep gradually into the underground water storage areas.

Forest plant life grows in layers. The lower layer contains the simple plants, ferns, and flowers on the forest floor. The intermediate layer is made up of shrubs and small trees. The upper layer consists of the crowns of the tall trees. Vines grow up through all layers in search of light.

a. Simple Plants, such as algae, fungi, lichens, mosses, and liverworts abound in a woodland community.

Algae comprise nearly all seaweeds and pond scum. Aerial algae absorb water from the air. For example green algae on the shady side of tree trunks do this. Some algae are widely used as food, particularly in the Orient. Algae may reproduce by breaking into parts (vegetatively); by production of spores (asexual); or by a fusion of reproductive bodies (sexual).

Fungi include bacteria, rusts, smut, mushrooms, yeasts and molds such as mildew and penicillin. Some fungi grouped under the term saprophyte feed only on dead plants or animals. Some bacteria are partial saprophytes because they live part of their lives on dead plants or animals and part on living plants or animals. Fungi which live entirely on living organisms are called parasites. All saprophytes, partial saprophytes and parasites must depend on food that has already been made by some other living thing since they have no chlorophyll and, therefore, can not produce their own food. (Fungi are commonly called the non-green plants.) They reproduce by spores (asexual) or by the fusion of two bodies (sexual).

Lichens are unique in that they are a combination of two plants - algae and fungi. The algae has the chlorophyll used to produce food for the plant and the fungi absorbs moisture and minerals from the surface on which the plant lives. Lichens can survive severe conditions, growing on otherwise barren rock out-croppings. They produce an acid which helps break rock down into soil. The common greenish lichen seen on trees and rocks grows at the rate of about one inch in twelve years. Lichens are food for

reindeer and moose. Reproduction is mainly vegetative; parts are broken off by the wind and blown away to anchor elsewhere.

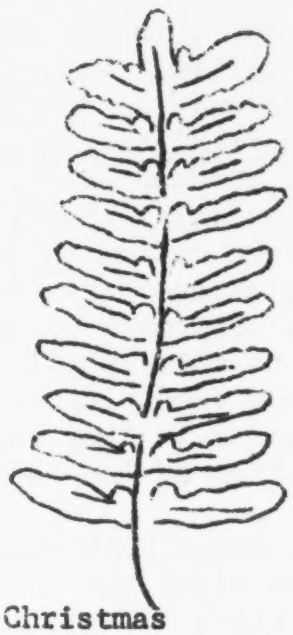
Mosses thrive in areas of high humidity, multiplying by regeneration, branching, or spores. The Sphagnum or peat mosses are useful in gardening since their numerous empty cells can absorb a great deal of water. The true mosses (Bryales) grow upright and have a leaf-like structure on the stem.

Liverworts are small green plants closely related to the mosses. They grow in damp, shady places, on rocks, and bark, and sometimes in water. The lower liverworts are shaped like minute leaves of seed plants with many lobes. The main body of the plant which looks like a leaf is called the thallus. Liverworts get their name because the thallus is often shaped like the human liver. Liverworts reproduce in several different ways.

b. Transitional Plants such as

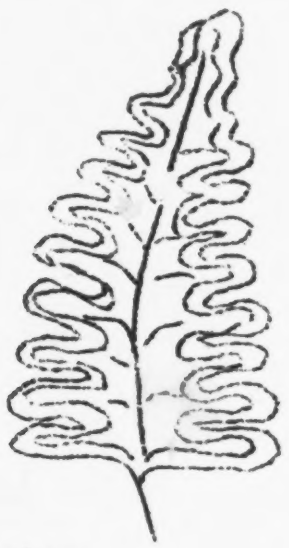
Ferns have some characteristics of both the simple plants and the highly developed spermatophytes. They can produce chlorophyl but they reproduce like the simple plants. Reproduction may be vegetative (runners), or a cycle of asexual (spores), sexual (sperm and egg cells) alternation. Ferns prefer a shady, moist habitat and have been called a primitive plant. They have a distinctive leaf pattern with an irregular outline. Where the seed plants are the most important today, the ferns were the dominant plants of the Mesozoic Era (200,000,000 to 70,000,000 years ago - the age of dinosaurs).

SOME WOODLAND FERNS



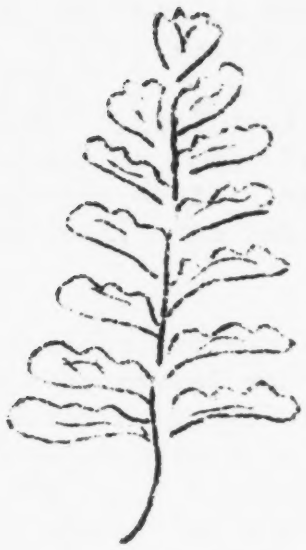
Christmas

Each pinna of the Christmas fern looks like a tiny Christmas stocking.

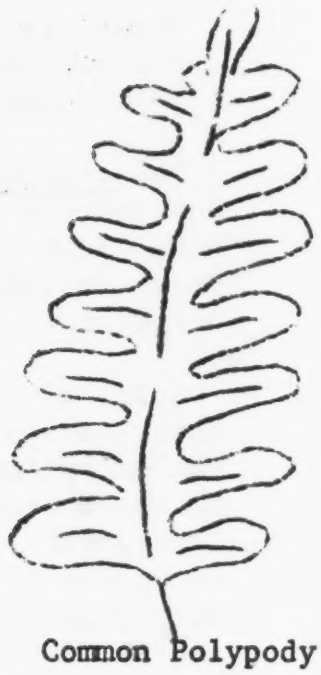


Bracken

Also called brake is large and coarse, with several leaflets branching in pairs from a tall stipe.



Five Finger



Common Polypody

is a small fern with thick, deeply cut, smooth-edged fronds.

c. Complex Plants reproduce sexually by the union of a sperm cell and an egg cell. Seeds resulting from this are distributed in various ways. These highly developed seed bearing plants are called SPERMATOPHYTA. Spermatophyta are further classed as Gymnosperms, the conifers, and angiosperms, the true flowering plants.

Gymnosperms bear unprotected or naked seeds, usually in cones; most are evergreen with stiff, needle-shaped leaves. Seed ferns and the ginkgo are exceptions.

Angiosperms bear their seeds in a covering. All have roots, stems, leaves, flowers, and seeds. Some have succulent fruits in which the seeds are embedded. Fruits, seeds, flowers, leaves, and stems of various plants are used for food by man and other animals.

Angiosperms are further subdivided into:

Monocotyledons - single seed leaf as grasses, orchids and palms.

Dicotyledons - two seed leaves as on vegetable plants such as beans, most deciduous trees, shrubs, and herbs.

(This is observable only when the seedlings are very young.)

1) Trees, of course, are the essential ingredient of a woodland community since it is their abundant growth that causes the community to exist.

Trees are the largest plants. The largest of all trees are the sequoias, the most famous of which is the "General Sherman." (It is forty adult steps around at the base.)

The cone-bearing trees are called (conifers." These trees have narrow leaves, called "needles." Most of the conifers have green leaves throughout the year. Since they keep their green leaves, except for shedding a few at a time, they are referred to as an evergreen tree.

A few of the conifers are not true evergreens as they shed their leaves in the fall and sprout new leaves in the spring. The exceptions are the larch and bald cypress trees. The life of the evergreen leaf differs from the deciduous leaf as it lives from 2 to 8 years. Perhaps the long life span of the evergreen needle is due to the thickness of it which provides more protection from dehydration as compared to the thin leaves of the deciduous tree.

Conifers are considered as some of the most valuable "soft-woods" or timber trees. A majority of the conifers are soft-woods. Commercially the Douglas-fir and white pine are considered the most valuable cone-bearing trees.

The conifers most common to Maryland are the hemlock, of which virgin stands can be seen in Garrett County, and the Virginia pine. Cypress grow in a swamp in Calvert County. Cedars, white pine, scrub pine, and others can be found.

The pines within the usual deciduous wooded area in eastern Maryland eventually die out. They are "cover plants" used by nature to heal an area that has been harvested of its deciduous trees or that has been burned over. Once the deciduous trees flourish, good conditions for pine growth no longer exist. No new seedlings "take hold" and the mature ones struggle through to old age, then fall and decompose into humus for the soil. In this area oaks, maples, and poplars are the predominant trees.

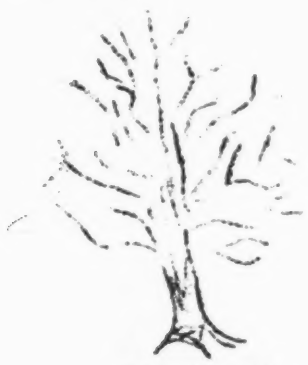
Broad-leaf trees drop their leaves in the fall. They are called deciduous meaning "to fall." The fall of the leaf is the end result of a very orderly process. As autumn approaches most of the minerals have been transported from the leaves to th tree's tissues. The leaves remain attached to their branches giving their autumn array of colors until the manufacturing of food for the tree stops completely. Bud protection of the life of the leaf of the deciduous tree is governed by the season. The new leaves of the deciduous tree unfold in the spring and remain on the tree until autumn.

Commercially the white oak tree is considered America's most valuable hardwood tree.

The different varieties of deciduous trees can be distinguished by:

size, shape and structure of their leaves
the shape of the tree itself
the way it branches (alternate or opposite)
the appearance of the bark
the type of buds, flowers and seeds

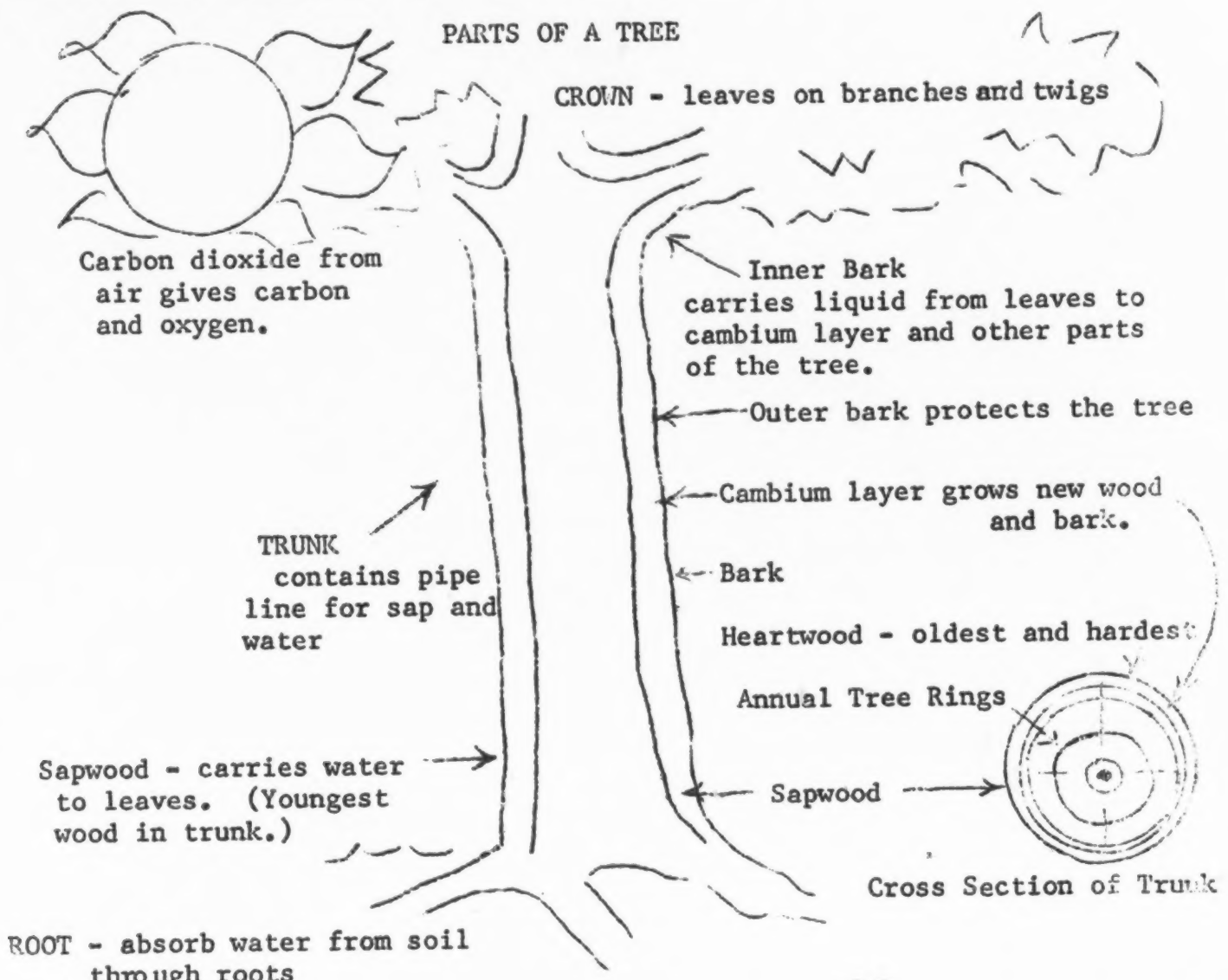
Sugar Maple



Black Oak

Shagbark Hickory

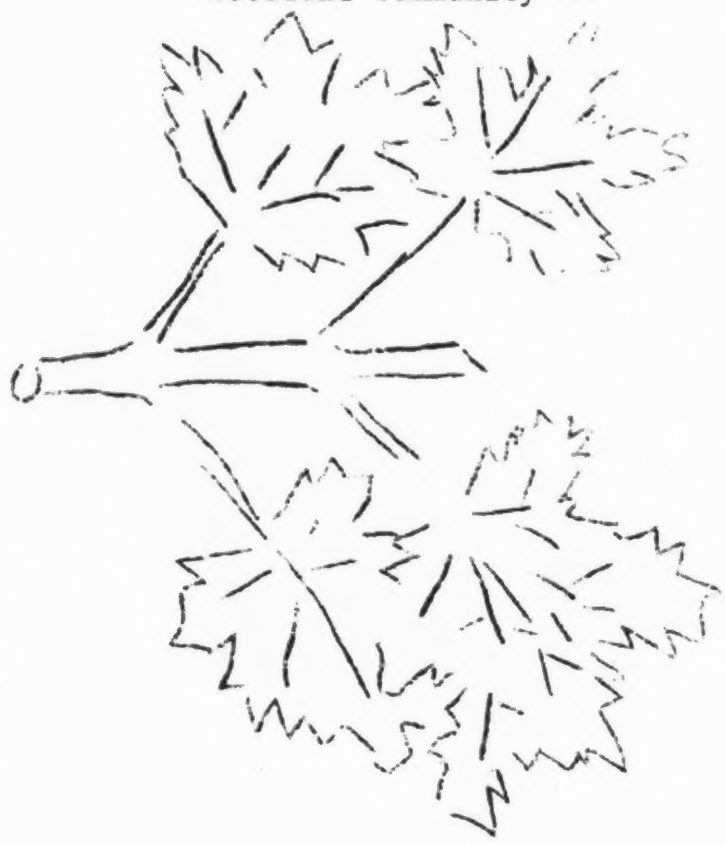
Tree Shapes - as illustrated above can help identify trees especially during the winter season when the trees are bare.


PARTS OF A TREE
CROWN - leaves on branches and twigs
Carbon dioxide from air gives carbon and oxygen.
Inner Bark carries liquid from leaves to cambium layer and other parts of the tree.
Outer bark protects the tree
Cambium layer grows new wood and bark.
Bark
Heartwood - oldest and hardest
Annual Tree Rings
Sapwood
Cross Section of Trunk
TRUNK contains pipe line for sap and water
Sapwood - carries water to leaves. (Youngest wood in trunk.)
ROOT - absorb water from soil through roots

HOW A TREE GROWS

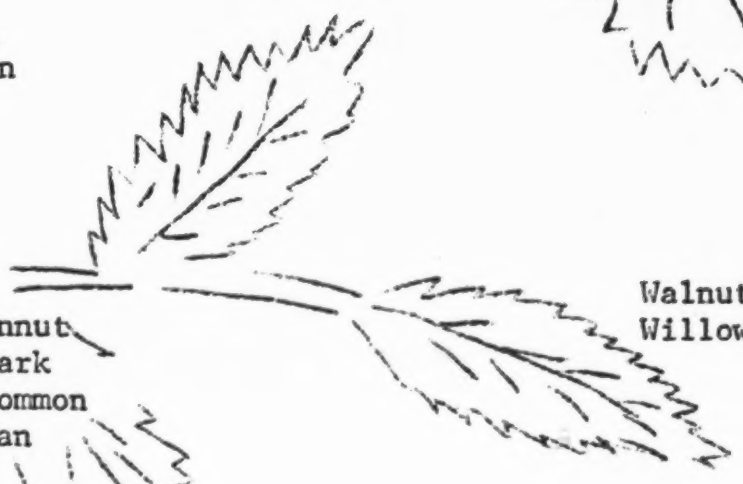
OPPOSITE

Ash, Black
Ash, White
Dogwood, Flowering
Horsechestnut, Common
Maple, Norway
Maple, Red
Maple, Silver
Maple, Sugar



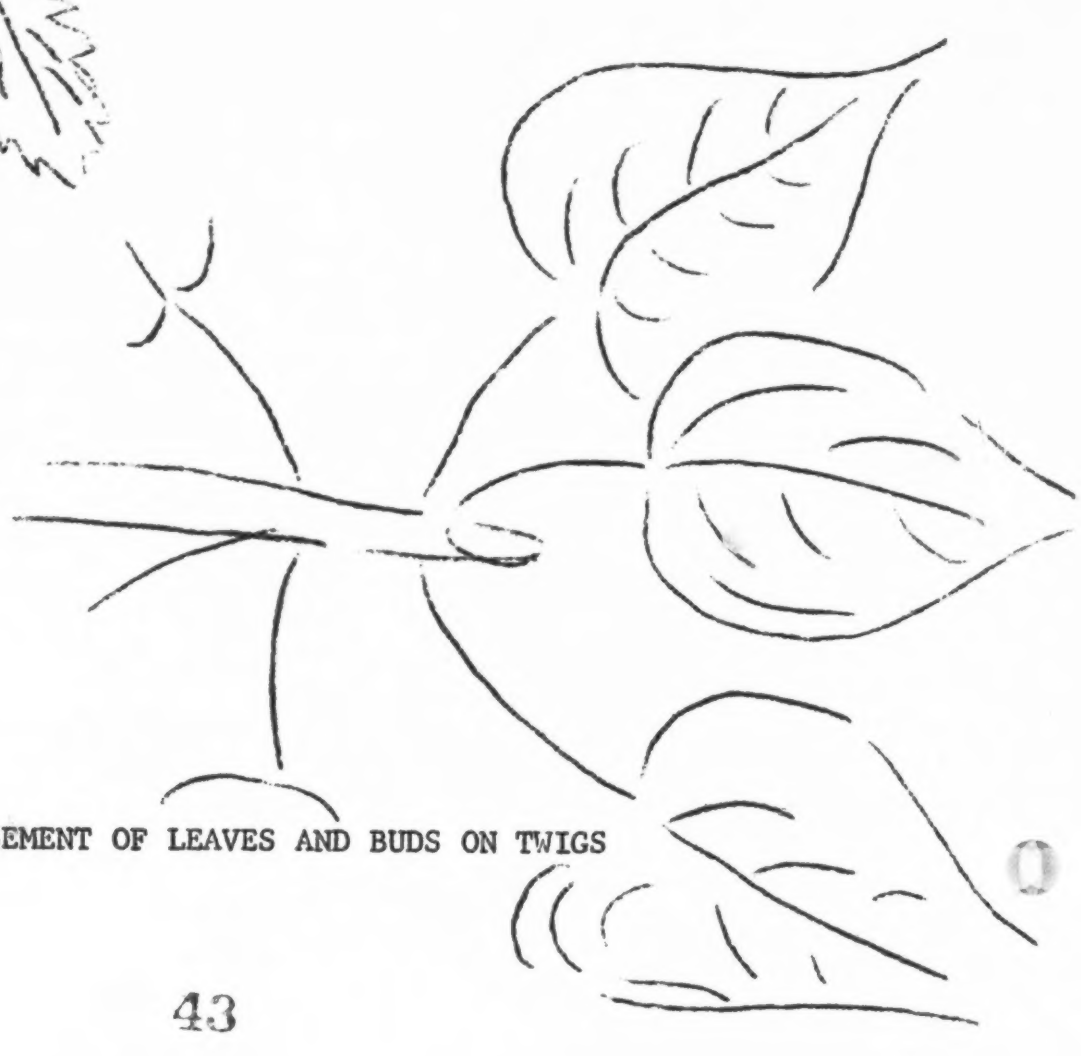
ALTERNATE

Aspen, Quaking
Beech, American
Birch, Paper
Birch, River
Blackgum
Butternut
Cherry, Black
Elm, American
Hickory, Bittennut
Hickory, Shagbark
Honeylocust, Common
Linden, American
Locust, Black
Oak, Black
Oak, Eastern Red
Oak, Pin
Oak, Scarlet
Oak, White
Papaw, Common
Persimmon, Common
Sassafras, Common
Tuliptree
Walnut, Black
Willow, Black

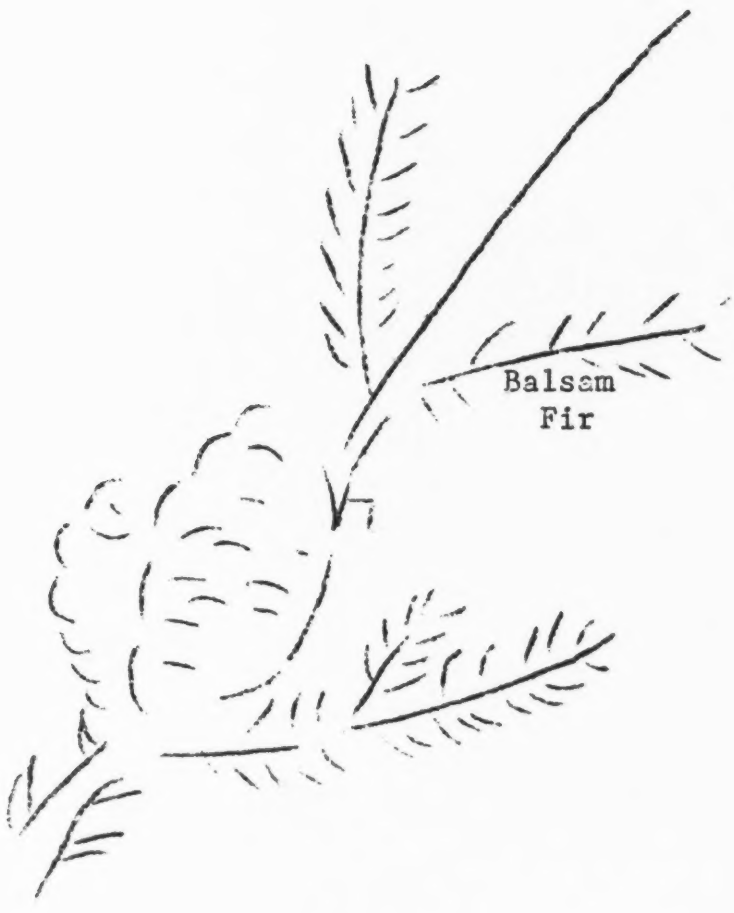


WHORLED

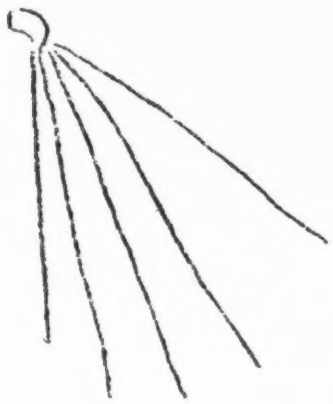
Catalpa, Northern



ARRANGEMENT OF LEAVES AND BUDS ON TWIGS



White Pine



Pitch Pine

THE AMERICAN ASH

The leaves of the Ash are compound with five to nine leaflets. The leaflets are opposite to each other. The wood of this tree is valuable as lumber.

COMMON POISONOUS PLANTS

Poison Ivy Leaves of three leave them be. It has three leaflets, is shiny green, turning red and orange in the autumn. Clusters of dirty yellowish white berries are formed later in autumn.

Poison Oak except for scalloped edges has the same characteristics as poison ivy three leaflets shiny, and clusters of berries.

Poison Sumac has 7-13 leaflets with greenish white berries.

First Aid Steps

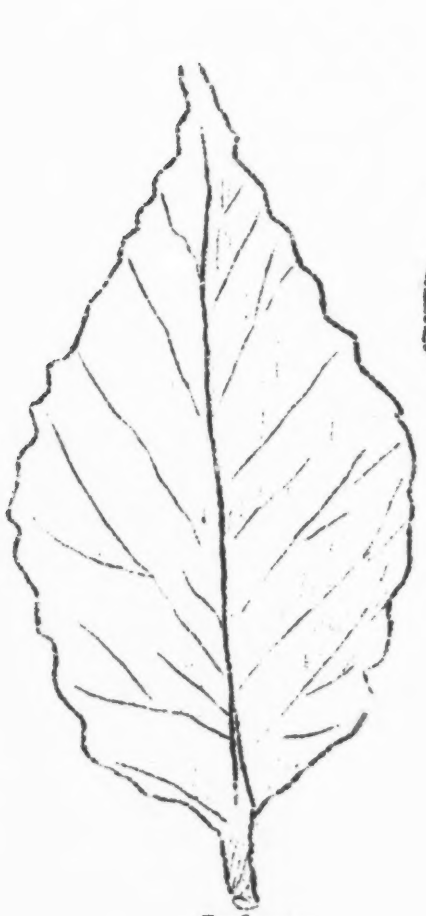
1. Wash thoroughly preferably with octogon soap.
2. If itching and reddened skin develop, avoid scratching and treat with soothing dressing. i.e. calamine lotion, epsom salts, bicarbonate soda.

THE BLACK WILLOW

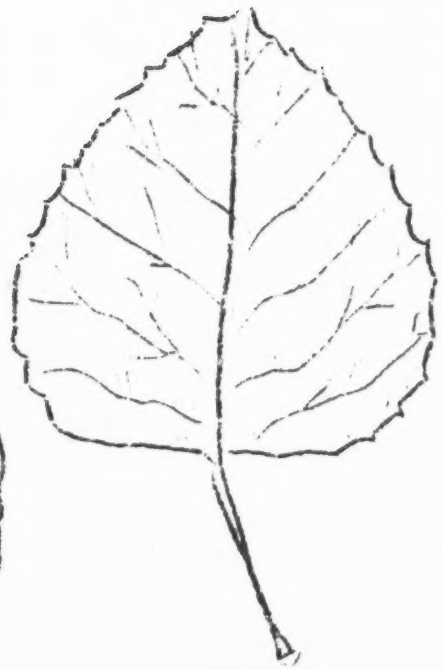
The willows are a large family, most of which are shrubs, but the black willow becomes a tree fully fifty (50) feet in height. It also grows very fast. Willows can produce roots easily when shoots are set into water. The willows have their flowers in clusters called catkins which appear early in spring.

THE WILD BLACK CHERRY

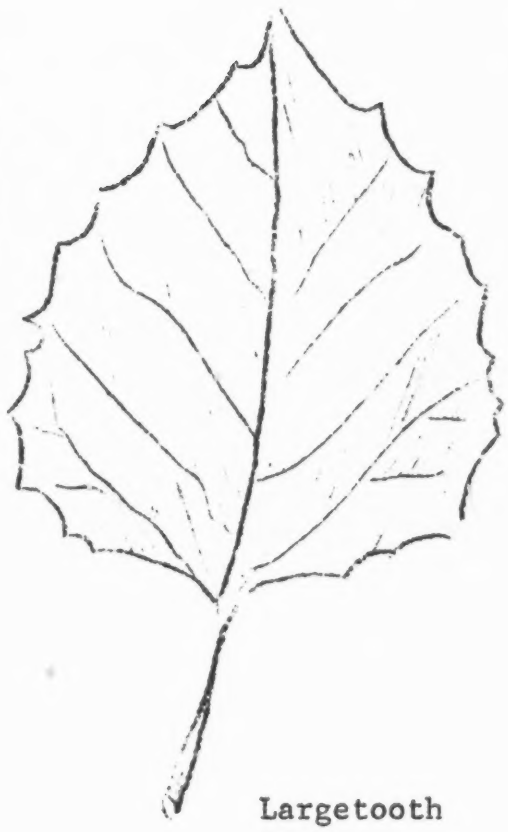
The bark on young trees is smooth, but in older trees it becomes somewhat scaly. There are line-like openings in the bark which are called lenticels. These openings allow air to get into the tree. The wood is dark red and is used for many types of furniture.



Balsam
Poplar



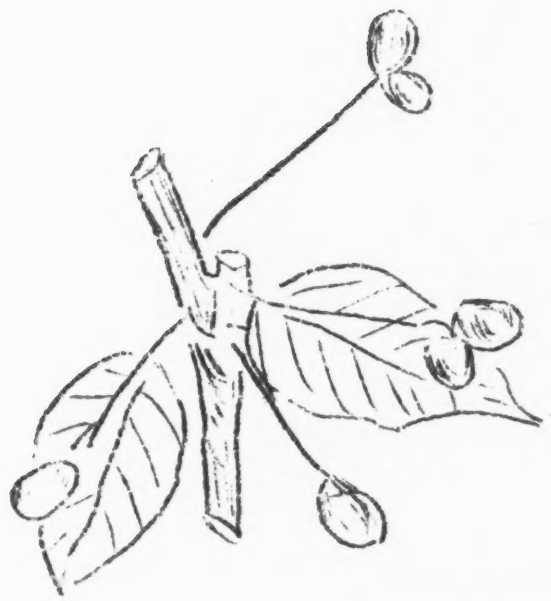
Quaking
Aspen



Largetooth
Aspen

THE ASPEN

The quaking aspen is the most widely distributed tree in North America. Aspens have a short life and are well adapted to cover land which has been destroyed by forest fires, because they grow quickly and hold soil so that it will not erode.

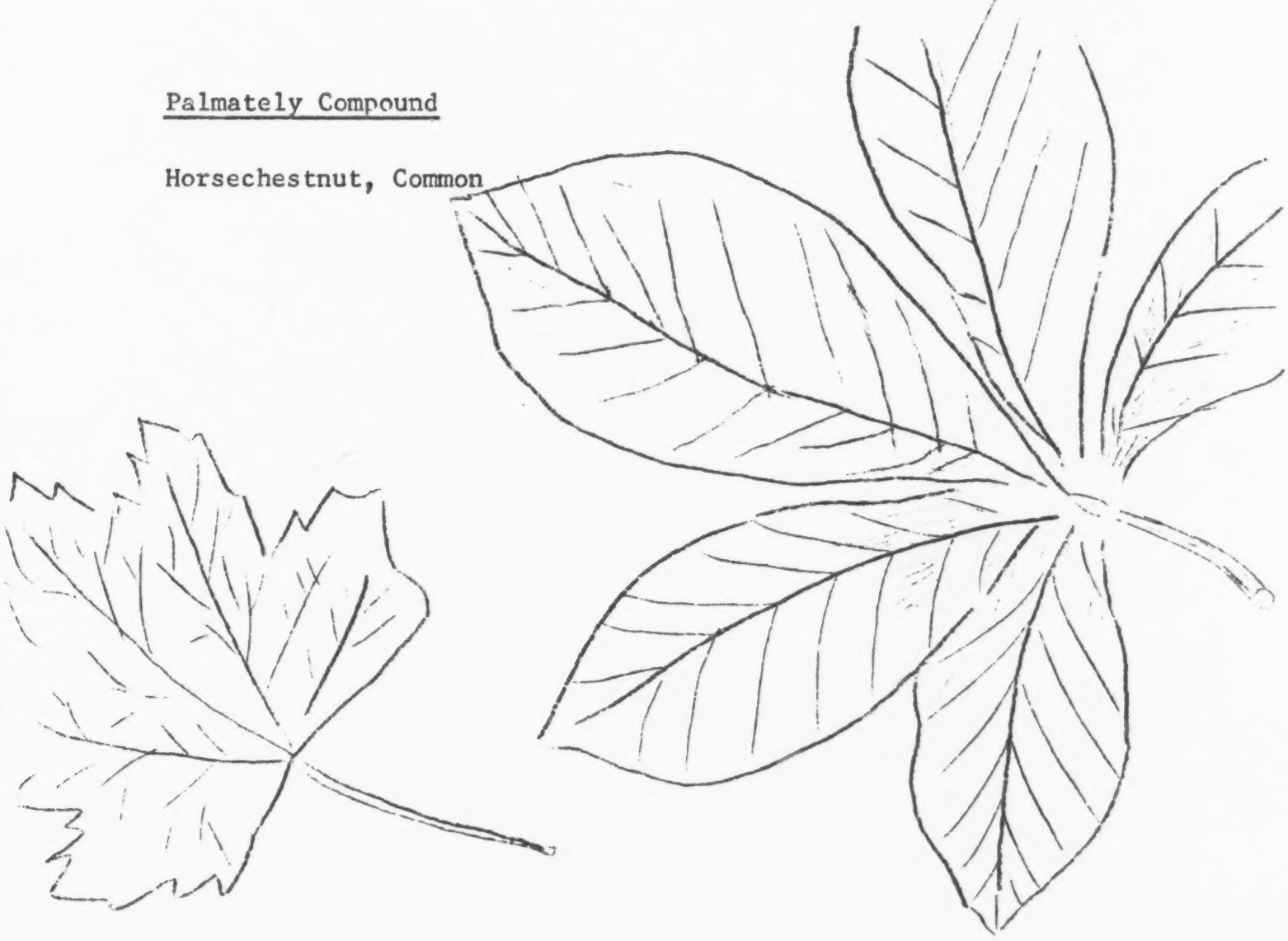


THE SOUR GUM

A relative of the Dogwood tree. It is also called Black Gum. It's wood is used for boxes and many kinds of wooden ware.

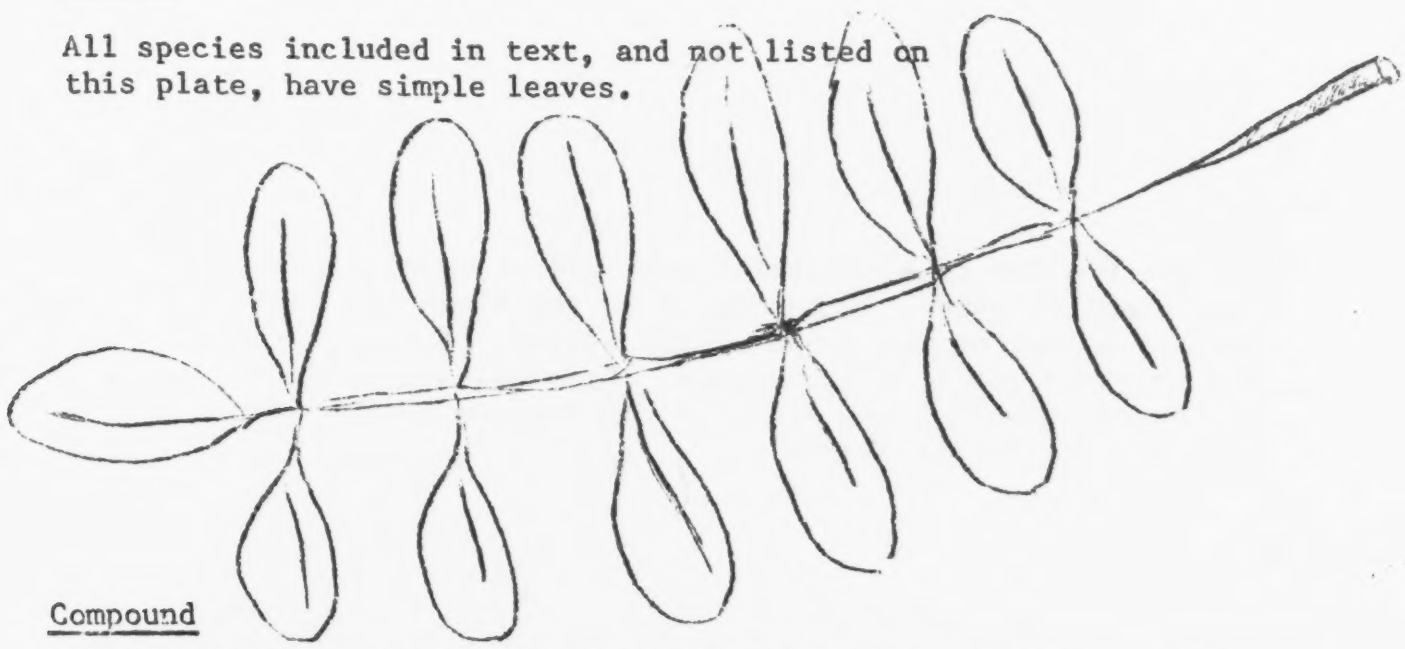
Palmately Compound

Horsechestnut, Common



Simple

All species included in text, and not listed on this plate, have simple leaves.



Compound

Ash, black ash, white butternut hickory, bitternut hickory, mockernut hickory, pignut hickory, snagbark honeylocust, common locust, black walnut, eastern black.

THE PIN OAK

The Pin Oak is a beautiful tree and is found decorating many people's yards. This Oak is in the black oak family and has spines on the lobes of the leaves. You may wonder how the tree got it's funny name. Some believe it's because of the old branches breaking off and leaving wooden like pegs or pins in the trunk.

THE RED MAPLE

In spring the Red Maple flowers before the leaves appear. The flower buds are clustered around the twig. It is one of the first trees to bloom in the spring.

THE WHITE OAK

The White Oak is found in many parts of the north eastern United States. This tree's leaves are long with rounded lobes. The bark of the white oak is somewhat light gray in color. Maryland is proud to claim this majestic Oak as it's State tree.

THE RIVER BIRCH

The River Birch has simple leaves with a wedge-shaped base and usually large teeth along the margins. The tree is found almost alwasys along the lower reaches of larger streams. The bark is reddish or cinnamon and appear to be peeling off in curled shaggy strips.

2) Wild flowers are herbaceous in the Maryland climate. They die to the ground every winter.

Wild flowers of the woods are unable to grow in open sunlight and need rich soil formed by the decaying leaves and woods. They usually bloom in early spring before the leaves are fully grown, as the shade prevents their complete development.

Common woodland wild flowers are:

violets	trillium
rue anemone	spring beauty
blood root	lady slipper
Jack-in-the-pulpit	may apple
burgemot	columbine

Other wild flowers that are found in the open fields or along the roadsides thrive on sunlight and grow best in dry soil.

Some common wild flowers of the open fields and roadsides are:

goldenrod	asters
Queen Anne's lace	dandelions
black-eyed-Susans	chicory
wild rose	bluets
field daisy	wild beet
wild geranium	wild mustard
wild sweet William	buttercup
partridge pea	

Woodland Flowers

Violet

(May be purple, white, blue, or yellow)

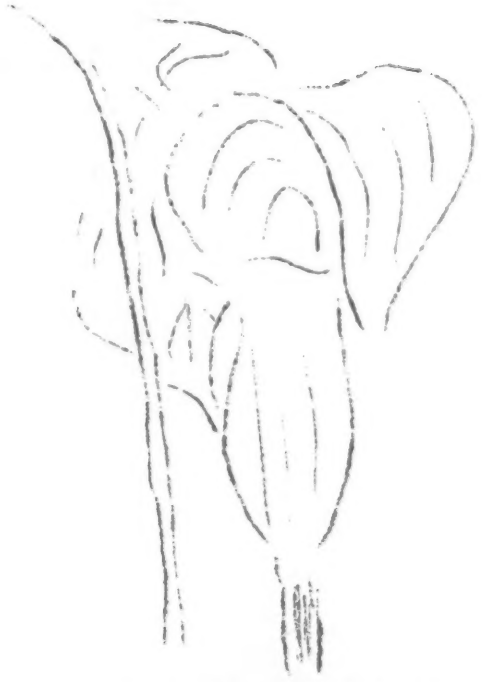
Spring Beauty

(Petals are pink and white with veins of pink)

Flowering Trillium

(Petals are white)

Moccasin Flower or Pink Lady's Slipper (as lovely an orhid as its tropical relatives)



Jack-in-the-Pulpit

(resembles a minister standing in a pulpit)

Wild Flowers of Fields and Roadsides

Goldenrod (easily seen in late summer and autumn)

Queen Anne's Lace or Wild Carrot

Wild Rose (Dark green leaves and prickly stems. Flowers are pink)

Partridge Pea (orange-yellow petals, bears seeds in pods)

Black-eyed Susan
(State flower of Maryland)

2. Animal Life

All animals are alike in some aspect:

They are all capable of voluntary movement with self-locomotion by means of walking, hopping, crawling, swimming, or flying.

They must have an external source of food supply as they cannot make their own food.

They depend on green plants for food, either as a plant eater or to eat animals that eat green plants.

Animals adapt to the seasons, or to changing environmental circumstances. They have adapted body parts to facilitate food gathering.

Chipmunks take grain and nuts to their underground burrows.

Squirrels store the same type of food in hollow tree trunks.

Beavers pile up twigs and branches of various trees.

Woodchucks stuff themselves with food during the summer and go to their underground burrows for a period of hibernation.

Fox, a meat eater, has a more difficult time, as he has to search for food such as a squirrel or rabbit.

In the search for food, a deer uses his forefeet to paw away the ice to uncover plants.

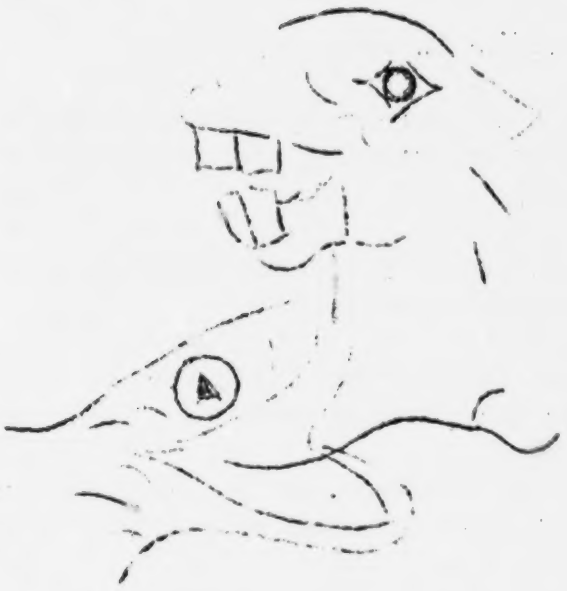
Adaptation of Teeth, Tongue and Mouth Parts

The tongue of a toad or frog is quick and sticky to help them capture insects.

Birds use their bills to build their nests and get their food.

Woodpeckers drill holes in trees and then push their hooked tongues inside to spear the insects.

Hawks have strong curved bills. These bills help them tear their meat into small pieces.



Rodents such as the beaver, squirrels and rabbits have two large teeth in the front of each jaw. These teeth are sharp enough to bite off twigs and bark or gnaw anything from carrot to trees.

A snake has an unusual mouth. It can open its mouth wide and stretch it far enough to swallow a frog. Its tongue is used primarily as a feeler.

Adaptations of Feet and Claws

Some animals use their forepaws for eating as the squirrel shown in the illustration. Others animals like the woodchuck and gopher also eat food with their forepaws sitting upright.

The crane has long slender legs that allow them to wade into the water to pick up fish and frogs with their pointed bills.

The hoof is a weapon for fighting, or a tool for digging. The deer will use his forefeet to paw away ice in search of plants to eat.

The owl or hawks have strong claws. Their strong claws and powerful leg muscles help them to grab their prey. Hawks are helpful as they also eat many harmful rodents and insects.

The webbed feet of ducks and some birds permit them to swim. The feet are like paddles. Ducks swim to get their food such as snails, fish, and water plants.

Animal homes are to be found in water, in the ground, among rocks, under tree roots, in trees and shrubs.

Some animals that may be found in runways or burrows in the forest floor are:

moles	shrews	skunks
badgers	groundhogs	mice
chipmunks	spiders	foxes

Some animals that like to have dens in rock formations are:

foxes	wolves
bears	weasels

Animals that prefer living in a tree:

raccoons	birds
flying squirrels	opossums
squirrels	insects
frogs	

Some animals that like to live in or near water are:

beavers	muskrats	insects
otter	birds	frogs
salamanders	turtles	

Some animals that have homes at or near the surface of the forest floor are:

deer	birds	insects
toads	skinks	rabbits
ticks	lice	turtles
snakes		

Animals compete for territory and declare property rights.

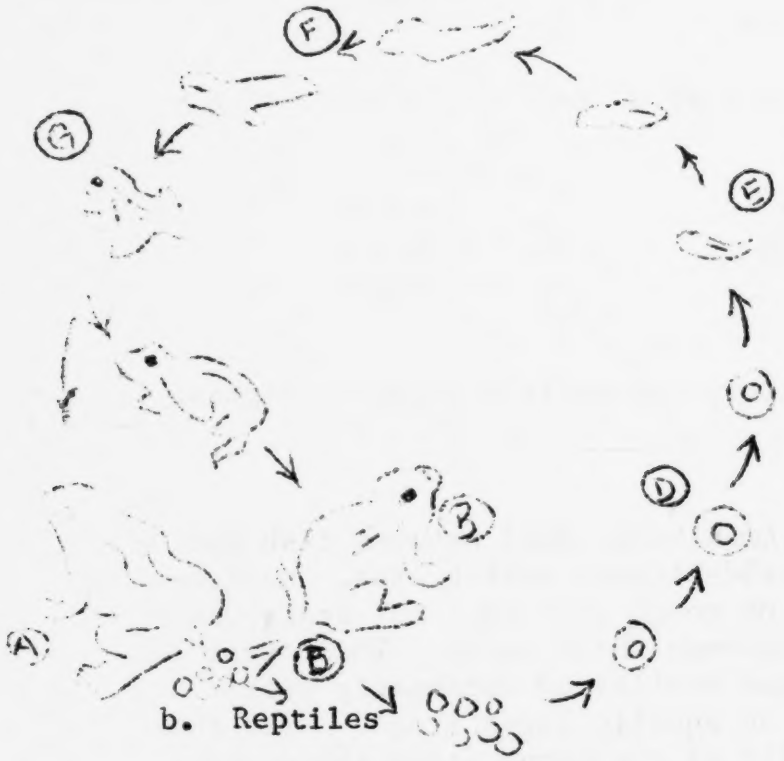
a. Amphibians

On the zoological scale, Amphibians fall between fish and reptiles. Amphibians are cold-blooded vertebrates. Most have four legs, either a smooth or rough skin (but not scaly), and breathe to a large extent through their skins. Their eggs are usually laid in the water and fertilized externally with metamorphosis resulting in an aquatic larva stage. With some amphibians the tail and gills of the larva stage change completely in the adult stage to a tailless, lung-breathing animal. You can expect to find frogs, toads, and salamanders in the Maryland woodland community.

Salamanders - Salamanders are amphibians with tails. Some species of salamander also keep their gills. The cycle of birth varies with different species and is partially dependent on the altitude of the habitat and the availability of water. The young are retained in the uterus until after metamorphosis if a region is not suitable for a larval stage in the water.

Frogs - Some frogs are only aquatic and others live largely on land. The bullfrog, which is found in this area, may grow to as long as eight inches. Frogs have a most, smooth skin and a rather slender body. They have long back legs which make them good jumpers. Insects are their chief food, readily caught with their sticky tongue which is attached to the front of the mouth. They hibernate in mud over the winter and lay their eggs early in the spring. The deep ha-rumph of the bullfrog and the high-pitched whirr of the tree-frog are familiar sounds of spring. Toads have a dry, warty skin and a stout body. Like frogs, they are good jumpers. They destroy harmful insects and grubs. They also hibernate, and follow the frog cycle of metamorphosis.

Life Cycle of a Frog



As the female A lays the eggs the male B sheds sperms on top C. Inside its jelly coating, D fertilized egg divides many times to form larva (tadpole) E which has gills and tails F. Eventually the legs grow (solid line) and larva is a small frog G. The eggs hatch from four to fifteen days after they are laid, but this differs with various types of frogs. After frogs have changed from F the tadpole stage to G it may take them years to become mature enough to breed.

Some frogs may live more than thirty years.

b. Reptiles

On the zoological scale, reptiles are vertebrate animals falling between amphibians and birds. Reptiles are usually characterized by a variable body temperature (but usually cold-blooded), lungs for breathing, a dry scaly skin, and internal fertilization. There are four orders of reptiles:

Snakes - Snakes are one of the major groups of reptiles seen today. Their major characteristics include a lack of limbs, no eyelids, no external ears, a slender forked tongue, and an elastic (not fused) jaw. They are cold-blooded. They are well suited to a habitat of dense vegetation. Movement is achieved by undulating their body from head to tail. The combination of this waving and the presence of movable ribs on the lower scales which catch on any surface projection makes possible the snake's forward progress. A snake's tongue is its major sensing organ. They are both carnivorous and insectivorous, with the prey being captured alive. A snake's teeth serve both to hook food and, in those species which produce poison, to inject the poisonous venom. Snakes have no true voice, but are capable of hissing via their large lung capacity. Rattlesnakes have a special sound-making apparatus on the tip of the tail. Some snakes give birth to live babies, but the majority lay eggs which require a warm, moist situation to hatch. The egg has much yolk, enclosed in protective membranes containing fluid (an amniote egg) and a leathery shell.

There are two poisonous snakes found in Maryland woodland communities:

copperheads
rattle snakes

No water moccasins have been found this far north. There are water snakes in the bogs, rivers, or lakes, however.

Lizards - Lizards are usually distinguished from snakes by the presence of limbs, although many lizards are without limbs. Lizards are extremely adaptable reptiles. Scales and coloration vary with the habitat, and some lizards are capable of rapid color change. Many lizards, like snakes, have no eyelids; but some do possess movable eyelids. Some lizards also possess a median eye on the top of the head which is protected by a transparent or translucent scale. As with the snake, the tongue is a major sensing organ. The majority of lizards are creepers, but their limbs may be modified to allow for scampering (over sand), climbing (over trees or rocks), adhesion to surfaces, and a prehensile (grasping) tail. Other modifications occur for burrowers and swimmers. Most lizards are insect eaters, but a few are carnivorous and some are herbiverous. Eggs in a tough, parchment-like shell are usually buried in the ground, to be incubated by the sun. However, it is also often found that the eggs remain in the female until they are at the point of hatching and are ruptured by the young at the moment the egg is laid. In the Maryland area lizards and salamanders are often taken for each other. Here there are many salamanders, but few lizards. Many salamanders are erroneously called "spring lizards" or "wood lizards."

These two groups look much alike, but are not related. Lizards are reptiles with dry dry skin and scales. Salamanders are amphibians, related to frogs, having no scales, but moist skin. Lizards enjoy the sun but salamanders avoid sunlight. If the lizard is confronted by an enemy, he too, like the snake, plays tricks. His tail is twice as long as his body and brittle. If the tail is seized by the enemy, the lizard pulls its body away from the tail and crawls to safety. Lizards found in the Maryland woodland setting are:

Turtles - Turtle (tortoise is chiefly characterized by a hard shell which encloses the vital organs, and provides some protection for the head and limbs.

The common names of reptiles in the United States have been standardized, designating "turtle" for all of those with a shell and placing "tortoise" as a secondary name for the slow-moving terrestrial species.

The turtle is a vertebrate animal and has probably changed the least of all reptiles in evolutionary time. The shell is very strong and completely protective. Some breathe by lungs and others have a throat adapted to function in a manner similar to gills. The neck is very flexible and can be drawn back into the shell. Turtles are toothless, but the jaws may have sharp, jagged edges which function as teeth, but are unable to grind fibrous plants. Their diet consists of snails, slugs, insects, worms, and crayfish. Large water turtles will catch fish and occasionally birds and small mammals. They eat frequently when food is available, but can live on weekly or monthly feedings. Some can store water to allow survival in long periods of drought. They are though to maintain a relatively constant temperature by changing their habitat. The female can lay fertile eggs for several years after a single mating. All turtles lay their eggs on land, in nests dug in the ground ranging from one to 200 eggs, depending on the kind of turtle. The mother turtle takes no care of the nest or the hatchlings, so they frequently fall victim to birds and mammals. Turtles outlive all vertebrates, reaching maturity within ten years with some species living as long as 150 years. They range in size from 3/4 ton twelve feet Atlantic leatherback, to less than a pound and only 5 inches in length. Most adult turtles have a shell length between five and fifteen inches.

Turtles seem to learn readily, comparable to laboratory rats; they exhibit "a degree of intelligence usually credited only to mammals." (Britannica)

Turtles meat and turtle eggs have been valued as food, and "tortoise shell" jewelry has created a threat to the turtle bearing this attractive coloration.

c. Mammals

Mammals have bony skeletons (vertebrate) as do birds, reptiles, amphibians, and fish. With the exception of the platypus and echidna (spiny anteater), mammals bear their young alive. Mammals are warm blooded with a body heat, controlled internally, but birds have this too.

Mammals form a distinct class of animals with two unique characteristics:

They produce milk with which they nurse their young.

They grow a covering of true hair or fur.

Most mammals are nocturnal and rather secretive, making it difficult to view and identify them during the day.

The squirrels, both tree and ground, woodchucks, and prairie dogs are an exception, as they are active by day. The smaller mammals - mice, shrews, moles, and rats usually sleep during the day and come out at night or early morning.

Rodents (Gnawing Animals) - Rodents have large front teeth especially adapted for gnawing. The chisel-like incisors grow continuously. There are many sizes of rodents from the small mouse and shrew to the fairly large beaver. Rodents live largely on land, with some being rather aquatic.

Rodents vary in their habits. The prairie dog, chipmunk, ground squirrel, and others live in burrows under the ground or beneath rocks or logs. The fieldmice nest on the woodland ground. Trees are homes for the squirrels. Streams and ponds will be used by the muskrat and beavers, as the location for their conical houses of marsh vegetation.

Rodents are generally noted for being quite destructive, but they also aid in controlling insect populations. Some rodents are valued by man for their fur, and others are used as food.

Chipmunk - The chipmunk is a ground squirrel about 5-6 inches long, plus a 4 inch tail, weighing only 3-5 ounces. He is described as "striped steward." He is known as a compulsive provider as his cupboards are never bare. During the summer the chipmunk is up early collecting nuts, grain, and seeds. He busily stuffs his collection in his bulging cheek pouches, burying what he does not eat. He often forget about his nuts, which later sprout to create new trees.

The chipmunk's home is a burrow or hollow in the ground about a foot wide, a foot high, and two feet long. A litter of five chipmunks usually appear in the spring, just 32 days after mating. The young do not venture out of the burrow until they acquire permanent teeth. The chipmunk lives about three years.

The chipmunk uses his front feet like we use our hands. He enjoys company and will make friends with humans while he chatters and sings. The chipmunk keeps a rapid pace during the summer, but slows down after the first frost. Gradually as the weather becomes cooler, he curls up in his nest with his heart barely beating. He sleeps on his food supply, which is his mattress. His food is convenient for instant nibbling when he awakes.

His enemies are birds of prey, snakes, weasels, foxes and others.

The chipmunk definitely is an attentive friendly animal to have around camping areas. However, he may destroy garden fruit and bulbs as well as dig a few unwanted burrows in the lawns of home owners.

Woodchuck - The woodchuck is about 18-26 inches long and weighs 4-10 pounds. He is also known as the ground hog and is best known for his "faculty" weather forecasting on February second. As the legend goes, if he sees his shadow he returns to his hole for six more weeks of winter; if not, spring is on the way.

The woodchuck sits up like a sentinel, alert to all. If he senses danger, he whistles a warning and chatters his teeth, then disappears under the sod. He is a stocky animal, with strong claws for digging. His home is in dens of an extensive burrow with two or more openings. These burrows may be 4-5 feet deep and 25-30 feet long.

Unlike many rodents, the woodchuck does not store food for winter, but eats greens constantly during the summer. Winter sleep is probably unbroken as long as snow is on the ground. He hibernates from October to February

Gray Squirrel - The gray squirrel is 8-10 inches long and weighs about 3/4 to 13/4 pounds. The gray squirrel rarely ventures far from trees, a homing instinct. He eats nuts, seeds, fungi, fruits, and the cambium layer beneath the bark of trees. He stores nuts and acorn singly in holes in the ground. Often he forgets about his storage areas and they sprout to grow into trees. He nests in holes of trees or builds a leaf nest in branches which are at least 25 feet above the ground.

The gray squirrel gives a series of short barks when he is excited. If an enemy is near he will flatten himself out on the side of a horizontal branch of a tree, where his gray coat is hard to see.

A litter of 3-5 gray squirrels are born 44 days after mating. When born they are hairless, blind, and the size of the last section of your little finger. They are weaned at two months. A gray squirrel can live approximately five years.

The gray squirrel is an important small game mammal for fur and meat. He is important as a reforestation agent by planting nuts and acorns.

Mice and Rats - There are about 400 species of mice and rats. Mice are small rodents with a variety of habitats. Common to this area are the house mouse, which will seek shelter in buildings, and the field mouse, which builds a nest in the fields of available grasses. Rats are larger and more fierce than mice, and will overcome any mice with whom they come in contact. Rats are omnivorous (eat animals and vegetables). They bear four to ten young at a time, 4 or 5 times a year.

Rabits and Hares - Rabbits are small burrowers, bearing three to eight young at a time and breeding four to eight times a year. They are a serious problem in Australia, where the lack of natural enemies enables them to multiply rapidly. They have long front teeth that grow continuously as they are worn away. Their diet includes the bark of trees. They have long hind limbs, a short tail, and long ears. Rabbits have been domesticated, and are valued for their fur.

The young are helpless at birth, blind, and naked. They are usually born in the spring and watched over by the mother for much of the summer.

The hare is similar in appearance to the rabbit, but somewhat larger and usually has some black markings on the ears. The offspring of the hare are born with their eyes open and covered with hair, and are on their own a month after birth.

Beaver - The beaver is a large aquatic mammal. They have webbed hind feet with a strong double claw, and large teeth for gnawing. Streams are their habitat, which they will dam up to make the water deep enough so it won't freeze to the bottom in the winter. They pack the dam together with mud which freezes in the winter and protects their home from attack by such predators as foxes.

They bear three or four young in the spring, with the two year old leaving home to find new territory. They have been much sought after for their fur so are no longer as widespread as they once were.

Marsupial (Opossum)-The opossum is the only pouched mammal in North America. It is among the most primitive of living mammals. The opossum is the size of a house cat, from 4-12 pounds. He has a pointed nose, much like a pig's, and a white face with paper thin ears. The tail is scaly, but serves as a "behind hand." He is a tree climber with a prehensile (grasping) tail, and fully developed toes which aid in climbing. His best-developed sense is that of smell, with rather poor eyesight and hearing. He seeks small rodents, birds, and frogs as the major portion of his diet, but will eat eggs, fruits, and seeds.

His natural habits are apparently a form of protection, as he does his prowling at night and hides during the day. As a further protection he may feign death when cornered "play possum".

The opossum may have two litters of young a year. The young are tiny and in an immature state at birth. The entire litter of fourteen could be placed in a teaspoon. After birth they remain in the pouch, about two months, to complete their development. When they leave the pouch, they often ride on the mother's back, holding on-to her fur or tail.

The opossum is occasionally hunted. They are edible, but the meat is considered oily. Occasionally they will raid poultry yards, but also destroy mice and insects.

Carnivora (flesh eaters) - These mammals are primarily meat-eaters, including your beasts of prey, fur-bearers, and some domesticated animals. Some carnivores may eat berries, nuts and fruit. They usually have five toes on each foot (never less than four) and sharp claws. They also have large canine teeth (fangs) and small incisors. Carnivores include bears, raccoons, weasels, and the dog and cat families.

Red Fox - The red fox appears to be a small reddish-yellow dog weighing ten to fifteen pounds. One litter of three to seven pups is born a year, usually in the spring, after a gestation period of 50 to 60 days. The pups remain in the den for about a month, then wander to the entrance to play and feed. The vixen nurses her pups for about six months. They leave their parents not long after being weaned. They will breed after they are oneyear old. The fox is most active at night. The male fox helps raise the young, bringing food to the den for several days after the pups are born. Later, both gather food to bring to their offspring. They eat birds and small mammals, sometimes adding frogs and insects or even fruit to their diet. Usually they have more than

one den so the pups can be moved if the home is disturbed, often borrowing a woodchuck's burrow. They prefer a home with at least two entrances to avoid being trapped inside. The red fox is known for his speed and endurance, leading many a hunter on a merry chase. If sorely pressed, he will take refuge in a chimney or house. Man is the only "natural" enemy of the fox, and he regards him as harmful if he kills pheasant, grouse, or rabbits, or raids poultry farms. The fox is beneficial to the farmer when he kills mice and rats. He has a bounty on his head which many feel should be removed, as most foxes are more beneficial than harmful. The fur of the red fox is valuable.

Raccoon - The raccoon has the distinctive characteristic of washing its food before eating it. They frequent streams for their major food supply (crayfish, fish, frogs), but have a varied diet that might include assorted eggs, insects, birds, small mammals, and nuts and fruits. They are strictly nocturnal and make their home high up in a tree.

They hibernate in the winter. Their coloration is particularly noticeable, having a black-and-white ringed tail, brownish body, and white face with a distinctive black "mask" across the eye area. They are hunted for both their fur and meat value.

Weasels - Weasels are extremely cunning and courageous in pursuit of their prey. They can follow an intended victim virtually any place: through water, dense undergrowth, in crevices, and up trees. They are a particular nuisance to chicken farms where they will seek both the eggs and the poultry as their victims. They also eat mice and rats, and frogs. The weasel has a long slender body with a small head, short limbs with five toes on each foot, and sharp claws. The upper fur is reddish brown and the underparts are white.

Skunk - The common skunk is a carnivore seen frequently in the Maryland countryside, often a highway accident victim. Its coloration is a distinctive black with two white stripes down its back. It is carefully avoided by other animals and man, being well protected with a strongly offensive secretion it can spray up to a distance of about ten feet. The skunk eats mainly insects, but some eggs, frogs, and mice. It produces one litter a year of 4 to 7 young. Its home is a den or burrow, and it hibernates in the coldest part of winter. It is mostly nocturnal in habit, and is sometimes sought for its fur.

Herbivora (plant eating) - These mammals are solely plant-eaters, and are themselves often food for carnivores. They are gentle animals, adaptable to the presence of man, and some herbivores have been thoroughly domesticated. Most hoofed animals are herbivores and we frequently see domestic use made of horses, cows, and sheep.

In this group of mammals we also find the Cervidae, which are hoofed and antlered mammals such as the deer, elk, moose, reindeer, and caribou. Of these, you might catch occasional glimpses of the whitetail deer in this area.

Whitetail deer - The whitetail deer grows 3 to 3½ feet in height, with a weight range of 75 to 400 pounds for the male and 50 to 250 pounds for the female. Their size varies greatly according to environmental conditions. Growth will be markedly stunted if they are forced to live open country. The males shed their antlers in late winter or early spring, growing successively larger ones each year until about the eleventh year when they begin to diminish in size. The antlers and front hoofs are used in fighting other stags. The deer prefers to flee when otherwise threatened, counting on its swiftness to escape and using its antlers only as a last resort of defense. Usually thought of as a browser, deer eat twigs, shrubs, fungi, acorns, and grass. They may be seen in groups up to 25 in the winter, but often singly in the summer, or just a doe and her fawns. The female usually produces twins after a gestation period of 6½ months. The young are weaned at four months, but may stay and run with the mother for as long as two years. A doe will refuse to breed as long as she is still "teaching" a fawn.

Deer is the main game mammal of the East and provided food and bucksin for the early settlers. At one time they were nearing extinction because of being so heavily hunted, but have now been replenished and must be controlled by periodic hunting seasons to keep their population in check. If the deer population is not controlled they can do considerable damage to orchards and vegetable crops, as well as stripping woodlands in their guest for food.

d. Birds

Birds are warm-blooded vertebrates of the class Aves. They differ from other animals, particularly in their adaptation to flight. Birds have a very light skeleton, which allows for the weight of the muscles and feathers that are necessary for flying. Friction is reduced because of the contour shape of their bodies. The plumage provides insulation and protection and enables the wings to lift and drive. Besides active flight, birds can glide or soar for long periods without noticeable wing movement. The ability to fly provides safety from enemies, and access to a wide geographical range for food selection.

The toes and claws of birds enable them to climb a tree, scratch for food, tear food, and perch on a branch. The feet are very powerful, as in the birds (owl, hawk) of prey.

Many birds are vegetarian (hummingbirds, geese, grouse) but some are carnivorous (hawks, eagle, cuckoo). Birds keep a vital check on insects that might otherwise ruin the world. Some birds are both herbivorous and carnivorous.

The bill appears in many adaptations depending on the primary food in the diet (whether for splitting seeds, piercing a skull, grinding nuts, insect-catching, cutting vegetation).

Birds have excellent vision and acute hearing, but only a few have a sense of smell.

Birds eat more in relation to their size than most humans. It seems the smaller in weight the bird is the more it eats in relation to its weight. Baby birds eat nearly their own weight in food each day.

The insect eating birds include the swallows, warblers, thrushes, vireos, chicadees, and nuthatches. These birds usually feed their young insects and worms. Many of these adult birds eat both seeds and insects.

Birds that eat seeds and fruit include sparrows, mockingbirds tanagers, waxwings, catbirds, bluejays, cardinals and many tropical birds. These birds have strong short bills to crush the seed coverings.

Meat eating birds or birds of prey include the hawks, owls, shrikes, osprey, eagles, and buzzards. They kill and eat other birds and such animals as rats, mice, snakes, lizards and squirrels. Their bills look like sharp hooks.

All birds hatch from eggs. The color of the egg shells usually blends with the surroundings for protection. Wild bird eggs that are laid in the ground have a shell that is usually white. Birds that build nests uncovered on top of the ground usually have colored eggs. The color blends of eggs range from spotted or speckled colors to plain colors of green, blue, red, gray, or brown. The shape of the eggs vary according to where the wild birds nest. The ground nesting-bird eggs have one large tip and a small tip, which causes the egg to pivot instead of roll.

Eggs must be kept at a temperature of about 99.5°. The adult body of the female or male bird provides the warmth by sitting on the eggs. An adult bird's body temperature is about 112°F.

Bird eggs hatch in about 12 days (sparrow) or 21 days (chicken). Some small young birds may spend only twelve days in the nest whereas the woodpeckers stay at least a month.

Bird's voices are used for songs, and warning notes. Each kind of bird has its own special song. A woodthrush has one of the most melodious of all birds songs. Sparrows may sing as many as 20 variations of the same song. The male bird is thought of as the songster. It is believed that the male sings to attract a mate or proclaim his rights to a certain nesting territory.

Some birds are named for their songs or calls as the bobolink, bobwhite, whippoorwill, and others. Other birds have songs that can be translated into English phrases making it easier to remember.

Birds help to protect the "balance of nature" by eating insects, preventing them from becoming too numerous. They also help to protect trees by eating insects that are harmful to them such as plant lice, scale insects and others. Birds help the farmers keep their fields free of weeds and insect pests. Studies have shown that birds eat more than 300 weed seeds for every square foot of farmland. Different kinds of birds are known to search for insects that live in a particular part or layer of the tree. For instance, the nuthatch searches for insects under the bark, the chickadee eats insects that grow on larger branches, woodpeckers poke below the bark for wood-boring insects, and warblers eat insects that destroy the leaves. Birds of prey (hawk, owl) kill rats and mice that eat grain.

Birds commonly found in the woodland community are: (all listed are native to Maryland)

*bobwhite
*wood thrush
veery
vireo
*owls
*black capped chicadee
*warblers
*mourning dove
*towhee
*chuck-wills-widow
*woodpeckers
nuthatch
*tanager
*tufted titmouse
*whippoorwill
*Baltimore oriole
Carolina wren
brown creeper

Birds that prefer lightly wooded areas or open spaces:

*kingbirds
*martins
*catbirds
*brown thrashers
*barn swallows
*song sparrow
evening grosbeak
rose-breasted grosbeak
*cedar waxwings
*goldfinches
*cardinals
*bluejays
*crows
*hawks
pee wees
*juncos
*mocking birds
*flickers
*hummingbirds
*grackles
purple finch
*robins
*bluebirds
house wrens
*starlings
*house sparrows

Birds that prefer meadows:

*bobolinks
*meadowlarks
kildeer
*field sparrows

Birds that like to live in or near water:

*cliff swallows
*kingfishers
*red-winged blackbirds
*sandpipers
*marsh wrens

Large water birds common on Maryland lakes, rivers, and along the Chesapeake Bay are:

*herons
*osprey
ducks
*canvasback
*redhead
*greater scaup
*whistling swan
*Canada geese
*mallards
*wood duck
*black

Game birds found in Maryland are:

grouse
ring-neck pheasant
woodcock
quail
mourning doves
snipe

Birds of prey:

*owls
eagles
shrikes
*hawks

Scavengers:

*buzzards

*all birds starred in the preceding list have been seen at Camp Letts.

e. Insects

Hosts of insects abound in a woodland community. Some are helpful in the life sustaining processes there. Others help in the decomposition of materials so they will add humus to the soil. Many are destructive. All have a place in the web of life there.

Please see the see the separate section on insects in this book.

f. Worms

Worms are animals with many cells. Some have a body cavity that contains their internal organs. Others are flat. They do not have a backbone.

Worms range in size from microscopic forms to tape worms thirty feet long.

Many worms live as parasites of man and animals. Worms of all kinds live by the millions in water, soil, and decaying material from plants and animals.

One of the most highly developed forms of this class is the earthworm. He plays a vital role in the web of life in a forest helping to build soil and aerate it.

Do not confuse the larva of insects with true worms. Most insects larva in worm form have three pairs of legs as an adult insect does.

Centipedes are not worms but feed on them.

D. Conservation

A widely favored definition of conservation is the following:

"Conservation is the use of natural resources for the greatest good of the greatest number for the longest time."

Nature works in many ways to maintain itself, replenishing supplies and reproducing species in a never-ending chain of adaptation to environment. Man may disrupt the normal cycle, but nature left to its own devices will return to its own naturally-occurring conditions. Thus a forest may be cleared for farming, but if the farm is abandoned the land will eventually return to supporting a forest if the climate and soil conditions have remained favorable to forestation. This process may take forty years, but such natural succession is predictable.

Land must be used properly today. Conservation is concerned with use and replacement of resources of today so that the people who come after us will be able to use and enjoy them too.

The inhabitants of a woodland community change as the environment changes maintaining whatever species are most tolerable of the present conditions. The development of a community is mainly dependent on soil and water conditions. A forest is dominated by trees of one or more species, each plant occupying a suitable niche.

The dominant vegetation supports certain fungi and bacteria, which in turn brings about decay and returns these materials to the ground for re-use by other plants. Plants have a high rate of reproduction (many seeds), which are easily moved to new environments by wind, animal movement, and others. There is a fierce competition of plants, with perhaps only one tree being the survivor of thousands of seedlings.

A major change in dominant life forms can occur because of serious erosion, volcanoes or earthquakes, a shift in moisture or temperature change or patterns, the development of new species, fire, clearing, drainage, and disease.

Nature supports itself with food cycles that support each thing in turn.

A typical food chain might be:

1. aphids eat the sap of plants
2. ladybugs eataphids
3. small birds eat ladybugs
4. hawks eat small birds
5. hawks die and return to the soil to produce minerals to raise more grass

Predators generally eat those animals which are the next size or two smaller than themselves. The energy output of the food must equal the energy to attack larger animals, or to spend a great deal of time pursuing considerable smaller animals.

Conservation is the concern of governments at local, state, and national levels. It also means personal responsibility from the doctor who protects human life, the teacher who prepares students for useful lives, to the work of the forest rangers, and many others.

The main areas of conservation are: soil conservation, water conservation, forestconservation, wildlife conservation, mineral conservation, conservation for recreation, and conservation of human resources. This unit (woodland community) deals directly or indirectly with all the areas except the last ones which are specific units in this outdoor education resource book.

1. Soil Conservation

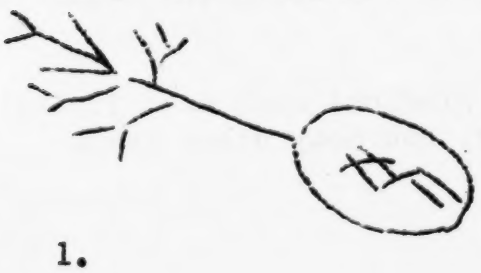
Soil is said to be the earth's most abused resource and one of the hardest to restore. It takes nature several hundred years to build an inch of topsoil. Erosion can wash or blow away this inch of soil in years or a just a few weeks. Present efforts to conserve soil include:

Planting of trees (see illustration)
Use of cover crops
Terracing hillsides
Rotation of crops
Prevention of excess drainage
Use of fertilizers

From the efforts mentioned above, soil needs to be kept in depth and productive. The prevention of erosion can be controlled by keeping the land covered with closely growing plants such as grasses and trees. (See Environment-Geology and Soil of this unit)

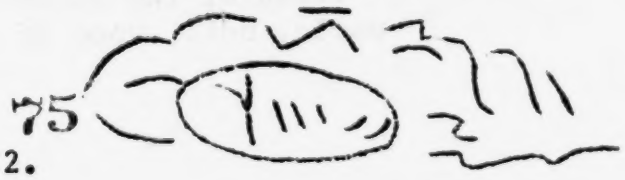
HOW TO PLANT A TREE

Wrap roots in wet burlap.
Keep roots moist.



1.

Dig the whole wider and deeper than the wrapped roots in burlap. Fill the extra depth with topsoil and peat moss and lightly press it down.



2.

3. Plant the tree at its original level. Pack moist topsoil firmly around the roots leaving no air pockets by stamping it down with your feet. Add more soil and firm again until it reaches original level. A saucer-shaped depression around the trunk helps in watering. Water the tree every day for the first two or three months.

4. Drive three stakes several feet away from the tree. Fasten a short piece of rubber hose around the tree and run wire or heavy cord from the stakes through the hose to keep the tree in position.

2. Water Conservation

Trees, grasses, and other plantsare important for the part they play in the natural circulation of water and means of conserving water. (See Environment - Water Hydrologic Cycle) (illustration) Plants prevent erosion caused by rapid runoff of water. Water can be held on the land by planting vegetation. This is especially important as natural storage for use in the dry seasons. If natural growth is not present in various areas, trees and grass should be planted.

3. Forest Conservation

Forest conservation is related to water and soil conservation. Forests and grass retain water and slow the runoff of rain and check erosion. When rain falls on barren or dusty crusted earth, it rushes off taking topsoil with it leaving gullies. Trees also can help prevent erosion caused by the force of wind if planted in advantageous areas (edge of fields).

Trees shelter the ground from the sun and wind. The leaves that fall "carpet the ground" and absorb the rain which in turn seeps into the ground.

The forest provides homes and shelter for many animals of the woodland which is explained in the section of animals.

The conservation of trees is important for the aesthetic value they give to any landscape, whether along the highway, in a park, or a shopping center.

Trees of the forest supply many products such as: fruit, maple, nuts, wood of various kinds, and many other items.

The following trees are valued commercially:

The products from the cacao, fruit, maple, nut, and other trees are used for food.

The cedar, cypress, fir, oak, pine, and other trees are used for building or lumber.

The birch, eucalyptus, poplar, spruce, and other trees are used for making paper.

Many of the musical and mathematical instruments are made from the wood of the cypress, basswood, and box tree.

Much of the woodenware and baskets are made from the wood of the ash, birch, blackgum, elder, and others.

The willow and elder trees are among those trees important for the production of perfume.

Turpentine, tar, and varnish are products made from the pine, spruce, and other trees.

Furniture is made from birch, walnut, mahogany, and other trees.

Lumber from the redwood tree is valuable for buildings, fences . . . as it is slow to deteriorate.

The forest conservation program's aim is to: restrict logging; prevent waste lumbering, protect forests from fire, disease, and insects; and reforestation.

Reforestation (or the reestablishment of trees) can be done by individuals that are interested in establishing new tree growth. The Forest Service often provides assistance to states or areas to reestablish trees.

Reforestation

The method of reforestation involves the planting of nursery-grown seedlings or transplants. Your own seedlings can be used for reforestation if you so desire. The process of starting seedlings is as follows: Seedbeds must be carefully prepared to start seedlings, (seeds of conifers sprout in 14-16 days, but can remain 2 years in the seedbed); seedling plants can be removed to "transplant beds") for a year or so to help them develop better root systems. Then the seedlings are transported to the area in need of reforestation (if a distance, waterproof sacks are used so moisture can be retained) in buckets or baskets.

Seedlings should be planted at intervals (8-10 feet apart each way) to prevent overcrowding in the future. After seedlings are planted continual care should be given to prevent problems as - competition of grasses or weeds, disease, and inadequate moisture which will hinder the growth and life of the plants.

The national forests are areas designated by the President and supervised by the federal government. Trees can be cut in these forests by individuals under the guidance of forest rangers who are responsible for the planned program of conservation.

4. Wildlife Conservation

The importance of wild plants and animals was pointed out in the section of "Life Forms" and their part in the balance of nature. Many birds and animals help destroy insects and control other pests; they help scatter and plant seeds.

The clearing of forests, draining of lakes and streams, and other methods used to promote industrial progress and housing developments endangered much of our wildlife in the Maryland area.

The destruction of wild plants and animals has been caused by poor planning, selfishness, or poor hunting practices. As mentioned before, it is just as important to prevent an over-abundance of some animals as it is tokeep others from becoming extinct. Fish and game laws restrict fisherman and hunters from killing too many animals. Other voluntary groups of nature lovers and sportsmen associations endeavor to protect our wildlife from depletion by restricting hunting and establishing game refuges, parks, and wildlife preserves.

The conservation of other resources • water, grasslands, forests, etc. means taking care of the places where they live. Wildlife need places to raise their young, and hide from their enemies. Trees and undergrowth needed for shelter for many animals as clean, cool water is necessary for fish.

E. Interesting Facts

1. The most common mammal is the mouse. (Some species have populations estimated in the billions.)

2. The longest living mammal is man, followed by the elephant which lives from 50-75 years.

3. Animals that hibernate during most of the winter include ground squirrels, woodchucks, some bats, bears, skunks, toads, frogs, turtles, and snakes.

4. A mother otter and infants take pride in their appearance, as they can be viewed taking turns combing each other with their claws.

5. A porcupine can not shoot its quills.

6. Frogs are nearsighted on land and farsighted whenswimming.

7. The smallest frog is the size of a penny and the largest is a foot long.

8. The average-sized frog can jump almost three feet, but the bullfrog can jump six feet.

9. Each kind of frog croaks its own call; the deep "jug-o-rum, jug-o-rum," is the call of the bullfrog.

10. Ornithologists are scientists who specialize in the study of birds.

11. Most wild birds lay from 4-8 eggs each year.

12. Bird eggs vary in weight - from a three pound egg of an ostrich, to less than two hundreths of an ounce egg of a hummingbird.

13. A bird will not fall from a twig or branch while he is sleeping due to the weight on the legs and toes which automatically clamp around the perch.

14. Smaller birds (as the sparrow and warbler) have from 1,300 to 2,600 feathers.

15. Some geese and ducks can fly 70 miles per hour.

16. An oak tree takes approximately 20 years to bear acorns.

17. The leaves of one large apple tree can hold fifteen barrels of water; after a rain the water can trickle into the soil instead of running off.

18. An acre of healthy forest may take 4,000 tons of water from the soil.

19. Trees can change the climate. The once undisturbed rainy forest regions of Africa now have drought.

20. Trees are thought to be more photogenic in the summer before 10 o'clock in the morning and 4 o'clock in the afternoon as their shadows contribute to their true beauty.

21. It has been stated that it would take 20 years or more to count every single spore in a meadow mushrocm.

22. Moss is more apt to grow on the north side of a tree where there is less sunlight.

IV. Pre-Camp Activities

(Please use pre-camp or post-camp activities at the time most desirable for your group).

A. Take a class walk around the school grounds to become familiar with trees and small plants which are present there. Find out which of this vegetation has grown spontaneously, adapting itself to this rather open environment.

B. List the names of trees growing in the school-community area. Have committees construct a "tree map" of the block where the school is located, or a map of a block where a child lives.

C. Visit a nursery to see how trees are grown.

D. Plan a field trip to a nature trail in one of the available regional parks.

E. Learn the procedures and steps to be taken when transplanting a tree or shrub. Plant some trees or shrubs on your school ground after determining suitable sites and suitable kinds of plants for your location.

F. Have a local "old-timer" visit the class to tell about changes he has observed in the natural environment with the encroachment of man (removal of woodland, lessening of game animals, which animals seem to adapt to man's presence if some sheltering materials is left-such as mice, squirrels, many birds).

G. Grow molds of various types and study the spores visible on them.

H. Purchase a mushroom from a grocery store and study its structure. (Even experts do not collect wild mushrooms because some contain deadly poison and its difficult to determine which ones.)

I. The various activities below are advantageous to the study of birds before camp and many of them can be used as camp and post-camp activities.

1. <u>Outdoors</u>

a. Observe the sizes of birds. "Is it as big as a robin?, sparrow size?" Use a known bird as a gauge.

b. Listen to bird calls and songs. Observe the bird as it sings or chirps.

c. Observe the bird to see and compare how different birds walk, hop, hop-run, etc.

d. Observe how birds use their wings.

e. Study their flight patterns. (Dipping of woodpeckers and goldfinches)

f. View and learn the silhouette of different birds. Make a bulletin board or electric board of the silhouettes and

develop a game around recognition skills.

2. Indoors

   a. Keep a migration calendar.

   b. List insect-eating birds, seed-eating birds, etc.

   c. Read books about birds.

   d. Listen to records of bird calls and songs.

   e. View slides, films, and filmstrips of birds.

J. Grow bacteria in Petri dishes using a beef broth food. Put a hair on the surface of one. Put "fingernail cleanings" in another. Put material swabbed from teeth in another. Leave one exposed to air for a few hours, then close it and put with the others. Try growing the collections under various conditions of temperature and moisture. Discuss the place of bacteria (germs) in the web of life.

   Consider the problems of disposal if there were no bacteria to help decompose materials. Consider the effect of the various environments you created for the microscopic plants.

K. Collect as many kinds of fungi as can be found-remembering the warning about poisonous mushrooms.

L. Bring a mature green, tightly closed pine cone into the classroom where it is warm and watch what happens. Let an interested child make a collection of the varied cones of the conifers contrasting the size of a hemlock cone to that of a sugar pine cone.

M. Collect sample blocks of wood from different kinds of trees. Varnish the blocks to make the grain show up. Put samples of seed pods and bark with each kind of wood when possible. (Small blocks of lumber can be secured at building sites or lumberyards or home workshops.)

N. Make a seed collection and divide the seeds into groups for display according to the ways they are likely dispersed. Observe the characteristics of each to see why they belong to a particular group. They may also be categorized as those used as food for man (nuts) and those used for other animals.

O. Plant the seeds of various trees in flats of woodland soil to see if you can produce a small forest. Maple seeds, ash seeds, sweet gum balls, pine cones, birch seeds, acorns and others can be easily secured in most communities.

V. Camp Activities

A. When on a trip along a trail, compare the soil layers and animal life in a square foot of exposed soil with a square foot of soil on the forest floor. Notice layers of leaf mold, comparative decomposition of leaves in the various layers, depth of top soil, amount of humus present, moisture, temperature, and animal life seen.

B. Have a scavenger hunt in the woodland.

SAMPLE ITEMS FOR A WOODLAND SCAVENGER HUNT

small piece of moss
2 pine cones
5 pine needles
3 acorns
4 water-rounded stones
1 sow bug
1 each of the three types of sassafras leaves
1 piece sycamore bark
1 slug
5 ants
1 oak leaf
handful of silt
4 insects
1 maple leaf
1 bird feather
insect gall
empty bird nest
lichens
1 fern frond
1 example of a compound leaf
blossom of the witch hazel flower

SAMPLE ITEMS FOR A WOODLAND SCAVENGER HUNT FOR UNUSUAL ITEMS

fossil
signs of animal life
Indian artifact
bones
medical plant
weathered man-made object

The group may be divided into teams or individuals may compete.

C. Follow the prescribed nature trail for which a guide is included at the end of this section.

D. Let a small group go through a selected area of the woodland and write riddles or jingles about things they see for the rest of the class to solve.

E. A class committee or the teacher can tag about twelve trees. The rest of the group then tries to identify the trees using the Zim book titled Trees. After students have completed their attempts, the entire group goes through the area and discusses things of interest.

F. A group of students may collect woodland materials to construct a class terrarium.

G. Make a colored slide collection of various kinds and colors of mushrooms and other fungi seen at camp. (Do not touch)

VI. Post-Camp Activities

A. Use imagination and see if a nature trail can be constructed on your school ground or in a nearby area.

Characteristics of a nature trail and the steps in building the school nature trail are:

1. Characteristics of a nature trail

a. Any trail leading through wooded or natural areas may be considered to be a nature trail.

b. Some nature trails which have been partially prepared by man are labeled and are thus much more elaborate than the simple path through the woods.

c. Nature trails serve as a means to bring people into a healthy and voluntary contact with people.

2. Steps in Building The School Nature Trail

a. The location for the trail is surveyed carefully to determine where and what sorts of natural features are available.

b. The trail is carefully mapped out, utilizing the most natural objects and facilities available. Some side trails may be desirable to reach some hard to include objects of interest.

c. The trail is most effective if it forms a loop and ends somewhere close to the starting point.

d. Some plants may need to be brought to the area to be transplanted in order to have enough variety on the trail.

e. The trail should be cleared to single file width. Remove those materials which might prove hazardous to the hiker. The natural look of the area should be preserved as much as possible.

f. Stepping stones, log bridges, etc. may be installed where needed. These make good school projects.

3. Labeling the Trail

a. The area in which the school is located must be considered. If vandalism appears to be a problem, the school may wish to consider one of the following methods of labeling the trail.

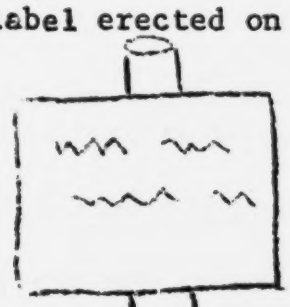
1) Metal tags on trees should be small and inconspicuous, easily made, and difficult to remove.

2) Objects on the trail should be given small tags, similar to above, with numbers on them. The person walking the trail is given a printed brochure which explains each numbered item in detail.

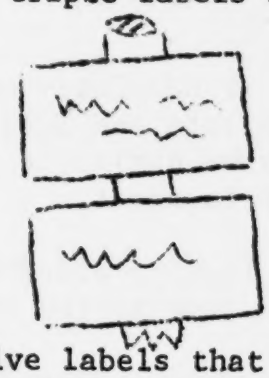
3) Each day trail runners distribute tags bearing information to the various points on the trail. At the end of the day, these are collected.

b. If vandalism is not a major problem, the school would probably want to construct more elaborate trail markers. Listed below are a few examples of easy to make types. The bibliography lists several sources for trail marker information.

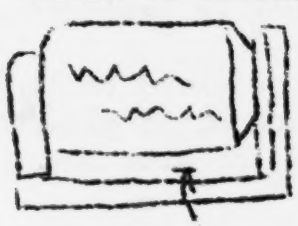
1) Single label erected on a wooden stake or pipe.



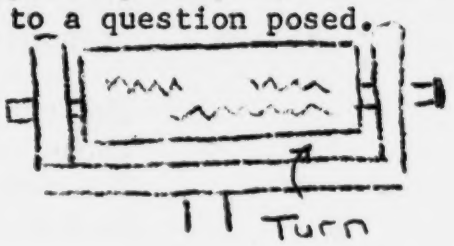
2) Double or triple labels erected on wooden stake or pipe.



3) Manipulative labels that may be opened, turned or revolved to reveal an answer to a question posed.



turn



4) Labels protected by housing or overhand.

c. Trail labels should be varied to keep the hiker's interest.

d. Labels should be easy to read and at eye level.

e. Question and answer labels are popular, and give the hiker something to do.

f. The language used on the labels should be chatty and friendly. They should be brief and not too technical.

g. Labels should be informative. Example: Poison Ivy - Leave of three, let it be.

h. Labels can be given to:

1) Flowering plants
2) Non-flowering plants
3) Vertebrate animals
4) Invertebrate animals
5) Animal homes
6) Rocks, minerals, soil types, etc.

i. Labels may be permanent for a tree or temporary for a toadstool, dead bird, etc., and some will change with the seasons.

j. The entrance to the trail should be clearly marked.

4. Growth of the Trail

a. The building of a trail is a never ending process.

b. The trail changes with the seasons.

c. New plants and animals may be added to the trail.

d. New things may be discovered and establishes, while old things may die or move from the area.

e. Pride in a nature trail must be instilled in the youngsters so that there will always be children coming along who are interested in improving and replenishing that which has been done before them.

B. Find the cost of hunting and fishing license in Maryland. Compare their cost with that of neighboring states. Find how many licenses are issued each year and compute the income received by the state of Maryland. Learn how these funds contribute to wildlife conservation.

C. Plan an interview with a local store manager. The class should discuss how wildlife affects various businesses as - hardware stores, sporting goods, sport clothing retailers, hobby-camera shops, and others. They should suggest some local stores where they could plan to interview the managers regarding the importance of wildlife to their businesses.

D. Build bird feeders of various types. See which birds like various kinds of foods.

E. Make birdhouses. Be sure to learn the specific requirements of the birds for which you are building the houses. Purple martin houses properly constructed and mounted can be real assets to a community for mosquito control when the colonies of martins move in.

F. Construct terrariums showing various kinds of habitats as desert, woodland, bog, and meadow. Make charts or murals to go with them showing the web of life typical in each habitat.

G. Make a frieze of birds in the community.

H. Let an interested group experiment with signals sent along the ground to measure comporative distances heard with distances the same signals could be heard traveling through air. (Rabbits communicate with signal thumps on the ground.)

I. Let one class member spray his clothing with a scented material such as a room deodorizer or citronella. Let others try to locate him by sense of smell. Try to set up a situation where they will have to use "down wind" and "up wind" as foxes, dogs, and other animals do.

J. Set up an earthworm farm in any shady place that can be kept damp on the school ground. Place piles of leaves or grass clippings over a given area. Moisten during dry periods. Collect and distribute a dozen or so earthworms to any class member that needs them in his yard to build a better growing environment.

K. Share the stories in Wild Animals I Have Known by Ernest Thompson Seton with the children in your class. The ones called "Redruff" and "Rag" are particularly good. They are not gushy and they give a feeling for life in the woodland community as few have been able to observe it. All the stories are good.

L. View the film "The Persistent Seed" to spark a discussion on the will to live inherent in all living things. Let students give examples they have observed. Try to create a feeling for the "sanctity of life" - life - a gift that no human can bestow to another species of animal or to plants, but one, he can destroy in a thoughtless or heartless instant. The Bristle Cone Pine is an excellent example of tenacity for life.

M. Spark discussions with shock statements written on the chalk board as:

1. All predatory animals must be destroyed. (Hopefully this will lead students to reading or stimulate use of reading done to defend their points of view.)

2. Cities have every right to use rivers to carry away waste material in order to save tax payers money.

3. Any citizen has the right to pick any flowers or collect any plants he sees on government owned land because his family helped pay for them.

4. It's foolish to use tax money to buy parkland when taxes are so high anyway and money is needed elsewhere.

5. Others you may think of.

N. Make a "movie" telling the story of what happened to the American chestnut tree or to the passenger pigeon or nay other species threatened or now extinct. Elm trees, sycamores and oaks are all now threatened seriously by diseases that as yet can not be brought under control.

O. Encourage the reading of biographies of such naturalists as:

John Muir
Luther Burbank
Gifford Pinchot
Theodore Roosevelt
Jonathan Chapman

VII. Games

A. Hold the Front or Number One Man

The leader is followed by the hikers in single file as they march along the trail. The leader then asks questions about things observed such as, "What is the name of that bird?" The first one in line, number one, answers. If correct, he stays in position. If he cannot answer correctly, he moves to the rear of the line and number two attempts to answer. Each player who fails to give the proper response goes to the rear of the line. The object is to stay in the "number one" position as long as possible.

B. Variation: Sentinel

Hikers walk single file. The lead man is the sentinel. He may find a rock, tree, flower, or any other natural object which he can positively identify. He stops. Each member must either whisper correctly the name of the object or go to the end of the line. The leader becomes the sentinel and the old sentinel goes behind those who answered correctly but in front of those who answered incorrectly. The object of the game is to get as near the head of the line as possible and to become sentinel as often as possible.

C. Nature Far and Near

Make a list of twenty or thirty items to be found along the route with a score for each, such as:

bird's nest - 10 points	monarch butterfly - 60 points
live snake - 15 points	animal track - 5 points
frog - 5 points	flying crane - 15 points

Points should difficulty of finding. The first player to observe one of these items and report it to the leader gets the points.

D. Find the Trees

Players are in groups of six. Give each group the pictures but not the names of ten trees that are in the immediate area. Have a balance between common and lesser know trees so that every group will have an equal opportunity to locate them, or have all trees alike in all groups. On signal, each group carefully examines the pictures and then tries to find the corresponding trees in the wooded area. If the players do not know the tree's name but can identify it as being the same tree they can name and identify. After a designated time, the search is called to an end. Ask the group finding the ten assigned trees, or most of the trees, to prove their answers by showing the other players the location of each tree for which the members have a picture.

E. Find the Trees in the Forest

The puzzle, shown, contains more than 20 species of trees. The way to find them is to begin with any letter and spell out the trees by moving in any direction without skipping a square. One may go diagonally and repeat a letter if desired. This is a good game to be used in group competition, or on a rainy day.

G	F	Y	E	W
I	R	C	H	M
B	A	E	L	O
L	D	B	P	U
I	H	S	A	M

F. Building Birds

Start with the name of a bird and build horizontally or vertically, like in anagrams. See who can build the most birds.

```
      THRUSH
C   O.  C
R   BLUEJAY
O   I   T
WREN    B   O
        KINGBIRD
            R   I
            D   O
                L
                E
```

G. Buried Birds

Give each team a series of sentences. Within the sentences are names of birds. The object is to underscore the name of the bird which is buried. The group to find the most buried birds wins.

1. The farmer engaged the thrasher for Monday. thrasher
2. It takes a brave bandit to rob in daylight. robin
3. Do doctors always charge so much? dodo
4. Do ventilate the new house better. dove
5. This pencil is a half-inch longer. finch
6. "Hit a fly," catcher Jones shouted from the dugout. flycatcher
7. Fred started up suddenly from his reading. red start
8. You can't kill deer without a license. killdeer
9. Bill patted her on the cheek jokingly. heron
10. I sent the pastor a Venetian vase. raven
11. The boy left the porch with awkard strides. hawk
12. The window looks over the garden. owl
13. The boy saw them both rush down the alley. thrush
14. Her eyes wandered over the curious crowd. swan
15. The crown lay shattered on the granite floor. crow

H. Aviary

In the aviary there are 53 different bird names. Can you locate them? The way to find them is to begin with any letter and spell out birds by moving in any direction without skipping a square. You may go diagonally and repeat a letter if you so desire. Try to find birds belonging to the same family, extinct birds, tropical birds, etc. Try to learn something distinctive about each bird you find.

Example: Begin with the letter B in the third row and spell blue jay.

D	O	T	Y	N	M	T
U	O	R	A	E	L	O
K	C	U	J	B	U	I
U	H	N	I	H	S	G
L	R	E	T	R	D	A
W	E	G	K	I	P	N
H	O	T	L	A	R	E

I. Birds Riddles

Each individual or team writes down the answers to the riddles. A leader reads the riddle. Winner: person or team with the highest correct total.

1. A bright bird, whose first name is that of a city. Baltimore oriole
2. To peddle. hawk
3. Less than the whole, a long line of hills. partridge
4. The period of darkness, the opposite of out, and a high wind. night-in-gale
5. An instrument for driving horses, not wealthy, and a boy's name. whip-poor-will
6. A monarch and an angler. king-fisher
7. A boy's nickname, an exclamation, and a part of a chain. bob-o-link
8. A bird of imitations. mocking bird
9. A tree, an insect product, and a part of a bird. cedar-wax-wing
10. A young fowl and two letters of the alphabet. chick-a-dee

J. Scrambles

Rearrange the letters to form the name of a bird.

obbthiew	bobwhite
diigrbnk	kingbird
cdfhignlo	goldfinch
arsprwo	sparrow
abelrrw	warbler
ceedkooprw	woodpecker
hhrstu	thrush
adenpprsi	sandpiper
aecukpssr	sapsucker

VIII. Woodland Community Bibliography

Berrill, Jacquelyn. Wonders of the Woods and Desert At Night

Best Book of Nature Stories. Bibliography Edited by Pauline Bush Evans

Conant, Field Guide

Comstock, Anna B. Handbook of Nature Study

Cruickshank, Wonders of the Bird World

Earle, Olive L. Birds and Their Nests

Fabell, Walter. Nature's Clues

Fisher, J. and Sir Julian Huxley. Pictorial Library of Nature

Friendly, Natalie. Wildlife Teams

Hagner, Dorothy. The Animal Book

Headstrom, Richard. Nature In Miniature

Jerr, William. Birds

Marx, Davis S. Learn the Trees From Leaf Prints

Marx, David S. The American Book of the Woods

Mason, George. Animal Teeth

National Geographic Society. Wild Animals of North America

Nature Trails Labels Park Management Series Bulletin 5, Michigan State University, East Lansing, Michigan

Owens, Howard B. Suggestions for a School Nature Trail

Owens, Howard B. Additional Suggestions for Nature Trail Labels

Pearson, T. Gilbert. Birds of America

Peterson, Roger Tory. Field Guide to the Birds and Field Guide to Western Birds

Petit, Mary P. My Hobby is Bird Watching

Pope, Clifford. Reptiles Around the World

Ripper, Charles L. Foxes and Wolves

Rymer, Louise C. Developing and Using a Nature Trail

Trees Yearbook of Agriculture 1949 United States Department of Agriculture, U. S. Government Printing Office, Washington, D. C.

Van Der Smisson, Betty and Oswald H. Goering. A Leader's Guide To Nature Oriented Activities

Watts, May Theilgaard. Master Tree Finder

Wetmore, Alexander. Song and Garden Birds of North America

Wild Animals of North America National Geographic Society

Zim, Herbert. Frogs and Toads

Zim, Herbert. Birds

Magazine

Grade Teacher - "Ecology" January 1969

Texts

Follett - The Big City Book of Conservation

Lyons and Carnahan - Conservation in America

Macmillan - Wildlife Conservation

Films

1461	Animals and Their Homes	11 min. Color
1654	Animals That Live in the Surf	11 min. Color
1445	Beavers at Work	11 min. Color
197	Camouflage in Nature	11 min. Color
315	Animals at Work in Nature	
368	Miracle of Trees	10 min. Color
701	Life of Molds	21 min. Color
736	Balance in Nature	17 min. Color
1035	Adapting to Changes in Nature	10 min. Color
1147	Living Things Are Everywhere	11 min. Color
1195	Life Cycle Between Tides	11 min. Color
1455	Leaves of Green	11 min. Color
50	How Nature Protects Animals	11 min. Black and White
215	Snakes are Interesting	11 min. Color
318	Birds Homes	11 min. Color
405	Birds Are Interesting	11 min. Black and White
689	Let's Catch Reptiles	10 min. Color
1141	Looking At Birds	11 min. Color
1185	Life Story of the Toad	10 min. Color
1319	Looking At Reptiles	10 min. Color
1320	Looking At Amphibians	10 min. Color
1476	Snakes	11 min. Color
1493	The Persistent Seed	14 min. Color

Picture Sets (8 large color pictures in a set)

W-58 Common Birds
W-55 Wild Animals

Transparency

OT-11 Life Cycle of the Frog

Tapes

T-389 How Birds Keep Warm In The Winter
T-576 The Live Submarine
T-578 The Bird and Its Home

SVE Filmstrips (available in some schools)

Modern Biology Series: "Finding Out How Animal Babies Grow"
"Seasonal Habits of Animals"
"Telling Trees Apart"
"Plant Factories"
"Birds of the Forest and It's Borders"
"Frogs, Toads, and Turtles"
"Dependent Plants-Mushrooms"
"Beaks and Feet of Birds"
"Living Things"
"Seeds and Travel"
"Soil Conservation"

Encyclopedia-Britannica Filmstrips

"The Coming of Reptiles"
"Pre-Historic Life"
"Age of Mammals"
"Learning About Mammals"
"Learning About Reptiles"
"Learning About Amphibians"
"Learning About Plants"
"How Seeds Are Scattered"
"The Parts of a Plant"
"Plant Needs"

McGraw-Hill Text-Film Division Filmstrips

Series 033510 "Ecological Succession"
"Field as a Community"
"Physical Environment"

Series 013382 "Adaptations to Environment"
"Change in Ecosytems"
"Habitat and Niches"
"Introduction to Ecology"

Materials Available to Teachers On Request

U.S. Department of the Interior, Fish and Wildlife Service, Washington, D. C., 20240. Pamphlets: Conservation Note 8 "The Migration of Birds," Conservation Note 1 "Birds," Conservation Note 5 "Bird Banding-The How and Why," "Protecting Our Endangered Birds," Conservation Note 6 "Snakes"

U. S. Department of Agriculture, Forest Service, Washington, D. C. 20250. FS-28 "List of Materials to Help Teach Forest Conservation" FS-21 "Forests Forever"

Same Department Soil Conservation Service, No. 175 "More Wildlife Through Soil and Water Conservation"

Material available from National Audubon Society, 1130 Fifth Avenue, New York, New York 10028, cost 15 cents.

"The Forest Community" series 27
"Track Stories in Mud, Sand, and Snow" series 16
"Animal Tracks" A Nature Chart, 14" x 22" -- 25 cents
"Life In A Pond" series 26
"Ways of Wildlife In Winter" series 29
"Common Mosses" series 11
"Illustrated Key to Common Lichens" series 27
"Seeds" series 19
"Nature Photography" series 27
"Nature Quiz" Electric Nature Games
"Things To Do In Nature"

As you walk along this trail, you will catch a glimpse of the ever-changing face of nature. To those who do not observe very closely it may always look the same, but in reality it changes a little every day. If you are the first person to walk it today, you will break a few spider webs and maybe step on some gumballs that fell during the night. In the soft mud near the water you may see the tracks of birds and night animals that were there just a few hours ago. Remember to keep your eyes peeled for the little things. They arejust as important as the big trees.

1. This tree with the star-shaped leaves and the hard irregular ridges on the branches and twigs is a SWEETGUM tree. This tree is the source of the spiny brown gumballs that you see scattered on the forest floor. These gumballs are really clusters of dry fruits which fell from the tree last fall. Each gumball contains one or two living seeds, and if conditions are right the seeds may germinate and grow to new trees.

What is the vine with the three leaves? It is POISON IVY. The sap causes painful rash and blisters, so if you accidentally touch this plant you should wash with strong soap and use calamine lotion for the blisters. In some places poison ivy grows like a little shrub and in other places like a vine. In late summer it has white berries which the birds eat. The poison does not harm the birds but if you ate the berries you would get very sick.

Down on the ground, you will see little plants with very branched leaves. They are called "ground pine" or "club moss" because of their appearance, but really they are neither pine nor moss but are related to the ferns. The stem creeps over the ground. Instead of seeds, this plant develops tiny yellow spores which are carried away by the wind.

2. This tree is called a TULIP TREE because of its big orange and white flowers and also because the end of each leaf is shaped somewhat like a person's lip. This tree is also called YELLOW POPLAR but it is not a poplar. It is related to the magnolia tree of the south. The fruit of the tulip tree resembles a young pine cone.

The wood of the tuliptree is light, soft, and easily worked. It is often used for building houses, and for making wooden bowls and broomsticks. The inner bark is very bitter and has been used as a tonic. The bark contains a chemical whichcan stimulate the heart.

Off to your right are several kinds of ferns. The one with the smooth stocking-shaped leaflets is called CHRISTMAS FERN. It stays green all winter and some people pick it for Christmas decorations.

Along the trail you will often find a thin white fungus growing like a little shelf on fallen logs and dead tree branches. If you look closely at this fungus you will see little curved white and brown rings around the top. Fungi like this one grow both on living and dead wood, and some of them become very large. These fungi are plants which live off the host plants on which they grow. They make living trees hollow and rot dead trees until you cannot tell the old wood from the soil.

On some of the trees you will find moss growing. Moss does not hurt the tree or cause rot like the fungus does. The moss grows on the cool side of the tree where the most mositure is. In a field this is generally the north side, because that side of the tree is in shadow more than the other sides. But in a cool, shady forest you may find moss on all sides of a tree.

3. This tree is AMERICAN HOLLY. It is called a broadleaved evergreen. People often pick the green leaves and bright red berries for Christmas decorations. The berries are a favorite food for many birds. The wood is light but tough, and used for making cabinets.

Do you see the little fern to the left of the trail? It has one branched frond standing upright on a stem. It is called RATTLESNAKE FERN because the spores are in a tight cylindrical cluster like a snake's rattles. Compare this fern with the Christmas Fern and the Ground Pine.

The vine you see on the tree trunks and on the ground is Japanese HONEYSUCKLE. It was brought to the Unites States from Japan many years ago and has become a pest, since it covers other plants or crowds them out. Honeysuckle keeps some of its leaves all winter though most of them fall off in the autumn. In summer honeysuckle has very sweet white flowers.

4. The tree you are looking at is an AMERICAN BEECH. This handsome species is easily recognized in winter by its long sharp buds, in summer by its finely toothed leaves, and in autumn by its hairy, prickly fruit. The fruit splits open in late autumn and contains an edible brown nut, which the squirrels like very much. Another striking feature of the beech tree is its smooth white bark. Many people carve their names into this bark and in doing so injure the delicate growing tissues of the tree. The open cuts also invite the entry of rotting fungus.

Beech trees grow best on moderately well drained uplands and along the valleys of streams, but no on dry hilltops or in swamps. The wood is hard and reddish and is often used for furniture, tool handles, and fuel. In Canada the sweet nuts are harvested and sold.

5. This tree is a HICKORY. Notice its leaves - there appear to be five on each leaf-stem, but each of these apparant leaves form what is called a compound leaf. In order to tell for certain whether you are looking at a leaflet or at an entire leaf, look at the base of the stem. If it is a complete leaf you will see a little bud where the leaf-stem joins the twig. Remember this when you see the Black Locust tree farther on; it too has compound leaves.

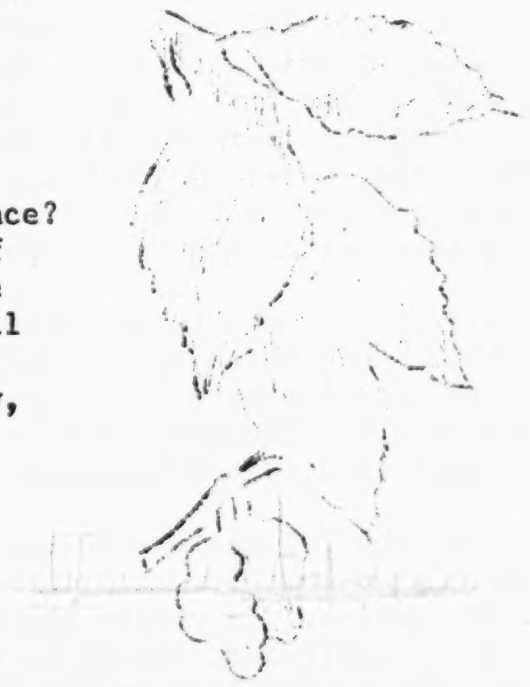
The fruit of the hickory tree has a hard, thick husk which splits open into four pieces to reveal a hard nut. Hickory wood is very hard but flexible, and is used for making tool handles and baskets.

Notice the fallen logs on the ground. They provide a home for many insects, mostly black beetles. In winter the spiders crawl under their bark and go to sleep until spring. Fungi also live on the dead wood, as we saw before, and after many years the log rots completely away and becomes part of the soil.

A side trail here takes you toward the water. Notice how thick the brush is there. Here in the woods the tall trees cut out much of the light, and only a very few kind of shrubs and vines can grow in their shade. (Two which can grow in shade are Honeysuckle and Poison Ivy). But near the water the trees stop, so that much more sunlight reaches the ground. Then the shorter plants use this light and grow taller and thicker. If a tree in the forest dies or is cut down the same thing happens there: a sunny spot is opened in the forest and soon the small trees and shrubs are growing up toward the light. After several years the sunny spot will be closed again by the new trees which have grown up. But along the shore there is always a sunny area, so the shrubs there can grow very thick.

You will notice that here is a lot of GREENBRIAR growing along the shore. This plant always forms a thick belt around salt-marshes and the shores of the Bay. Its sharp spines make it very difficult to walk through, but those spines also give protection to many birds and small animals which live there.

6. This tree near the trail is an AMERICAN ELM, a tree often planted in cities for shade because of its tallness and the thick canopy of leaves when the tree is mature. Notice how similar the elm leaves are to those of beech, but can you see the difference? Look closely at the teeth along the edges of the leaves. Elm trees do not have nuts like the beech and hickory; their fruits are small and light, with thin edges to help the wind carry them away. Elm wood is hard and heavy, used for floors and boats.



Notice the little clumps of grass-like plants along the trail. Pick one of the blades and smell it. It is wild onion.

Do you see the big hairy vines growing up the trees? You might mistake them for grape vines and start climbing and swinging on them, but grape vines have only a shaggy bark, not these hairy-looking roots that stick out on all sides and grip the tree trunk. Look at some of the leafy branches that stick out from the vines higher up. These vines are Poison Ivy, which we saw before. Next time you see a grape vine, look closely at the bark before you touch it.

7. This tall tree with the narrow leaves is a WILLOW OAK. You can tell its leaves from those of a Willow by the tiny spine on the tip of each leaf. Willow oaks have acorns in the fill like other oaks. They seldom grow big enough for the wood to be used.

Over by the water you see a tree broken off part way up. What do you think happened? Lightning? High wind?

Notice how the bank is eroding. The waves wash the dirt away at the base of the bank so that the bank crumbles. Some of the dirt is carried by the water out toward the Bay, but most of it is deposited fairly near the shore. After many years a sandy beach may form here. All over the Bay the waves are washing the shore away at some points and building it up at others. The trees on the bank resist this erosion, because their roots hold the soil together. But finally the soil may wash away anyhow, and the tree may fall into the water. Then it will die, and the dead trunk will break some of the force of the waves. Along the trail you will see more of this happening.

The big shrubs around us are VIBURNUMS. Notice their opposite leaves. The berries of these shrubs are a favorite with many birds.

8. The pine trees here are VIRGINIA PINE, also called Scrub Pine. You can tell this pine from other kinds because it has two needles coming out of the twig together. Virginia Pine is poor for lumber but is often used to make paper pulp, or for fuel. It grows rapidly on abandoned fields and other areas of poor soil. But it does not grow well in shade, so when a field is abandoned the pines grow up faster than the hardwoods, or broad-leaved trees. The hardwoods can grow in the shade of pines, but more slowly than they would in the sun. As the pines die and fall down, more sunlight is able to shine down to the hardwoods, which then grow up and take over. Here the process is nearly complete, and we have a few old pines scattered among the big hardwood trees. The older pines form cones, which contain the seeds, but since young pines cannot grow well in shade, few of them survive except near the edges of the forest or in open spots, where they get all the sunlight they need.

9. This tree you see growing along the bank with the thorny trunk is a BLACK LOCUST. Notice its leaves. Remember what we learned about the hickory leaves? The Black Locust has pretty white flowers and fruits like bean pods, but the beans are not good to eat. The wood is usually twisted and gnarled but is very hard. It burns well and lasts a long time in the ground, so it makes good fenceposts.

See the grass beside the marker post. It looks like a bottle-brush. This grass is common in salt marshes and provides food for birds.

The bank is eroding here too. We talked about this at Marker Post 7.

10. Can you tell how old this tree was when it died? Count the growth rings.

Notice the coarse yellowish grass along the trail. It is called broom-grass or yellowsedge. The pioneers used it to make brooms.

This low shrub with the dark green leaves is called WAX MYRTLE. The blue berries are heavily covered with wax and are food for birds. Like the Holly and the Pines, this plant keeps its leaves all winter. It grows best on damp sandy soil.

11. This tree is a CHESTNUT OAK. Its leaves resemble those of the American Chestnut except that the teeth are rounded and not pointed. Like other oaks and the Beech, Chestnut Oak is in the same family as Chestnut. The flowers and fruits of all these trees are rather similar.

Chestnut Oak grows best where the soil is well drained, either on dry hilltops or at the edges of steep banks. Can you guess why it would be growing here near the water? Probably because at this point the water in the soil drops down to the level of the Bay, leaving a narrow belt of fairly dry soil along the edge of the bank. Chestnut Oak is also the principal tree on the small islands here in the Bay, along with White Oak and the Hickory that we saw before. The wood is hard and very strong, and is used in all kinds of construction.

12. Here we have two evergreen trees, but they are not pines. The one on the right is VIRGINIA JUNIPER, often mistakenly called Red Cedar. It is a common species in old fields and is surprisingly tolerant of salt, for you can sometimes find it growing in the drier parts of salt marshes. Many birds eat the Juniper's hard blue berries.

Look at the big tree that has fallen into the water. The waves have washed all the soil away from around its roots.

The trunk of this small tree has been twisted like a corkscrew. Honeysuckle vines did that. They twined around the young tree and kept the trunk from enlarging as the tree grew.

This big tree is a BLACK CHERRY. Its shiny black berries are a favorite food of birds, and people often collect them to make jellies and pies. But the leaves contain poisonous cyanide, and cattle often get sick from eating them, so the poison protects the tree from cows and other plant-eating animals. Crush one of the leaves and smell it; the bitter almond smell is characteristic of cyanide. The seeds have it too, so when you eat a cherry, always spit out the seed.

13. This little tree is a SASSAFRAS. You can recognize it by its bright green twigs and by the irregular lobes on its leaves. Often you will find leaves of 3 or 4 different shapes on the same tree. If you chew a leaf or twig you will note its pleasant flavor. Some people make tea from the leaves or a tonic from the roots and bark. Birds enjoy the berries and deer like to eat the leaves and young shoots.

Across the trail is another small tree, a FLOWERING DOGWOOD. In the spring it has many flowers, each with four big white bracts which resemble petals. Because of these flowers, the tree is often planted in gardens. The fruits are bright red, in clusters. The wood is so hard that it was formerly used for bearings of machines, and is now used for tool handles.

17. Here we see Poison Ivy again. But this time it is growing on a pine tree, and this is very unusual. Both the pine and the poison ivy were killed in the fire.

18. We have come to a small salt marsh. The shrubs out there are SEA MYRTLE. They are not like the Wax Myrtle that we saw before. Sea Myrtle grows in the wettest parts of the marsh, and has coarse thick leaves and tiny white flowers. Also in the marsh you can see SALT CORDGRASS, a tall coarse grass whose roots bind the soil together.

On the bank is a tree with the trunk bent like a big S before it grows up. When this tree was young another tree fell across it and bent it over, then the fallen tree rotted away so that the younger tree could resume its upward growth.

19. Here are some more oak trees, different from the ones we saw before. These are SPANISH OAKS. These trees are growing more thinly than those we saw before, and have more spreading lower limbs. The wood of Spanish Oaks is hard but not very durable, and is used mostly for fuel. Its inner bark is very bitter and contains tannin, a chemical used for curing leather. We also have some more Beech trees here.

20. Now we have come to a small cove, or indentation in the bank. The bank slopes steeply down oward the water, so the soil at this spot is fairly well drained. Look around. We have Chestnut Oaks, Junipers, Holly, and down near the water a huge WHITE OAK. White Oak is a very stately and important tree. Its close-grained wood is widely used for boats and furniture.

Now look at the ground near the base of the tree. Those tracks are the tracks of muskrats, which live in the marsh and eat the smaller roots of the oak. To your right, down at the water, is a big stand of tall grass. This is SALT REEDGRASS; its thick roots and lower stems serve as food for swans and other water birds.

OUTLINE FOR STUDY OF SHORELINE

I. Purpose . . . . . p. 1

II. Scope and Sequence . . . . . p. 1

III. Background Information . . . . . p. 4

A. Web of Life . . . . . p. 4

B. Life Forms . . . . . p. 4

IV. Pre-Camp Activities . . . . . p. 9

V. Camp Activities . . . . . p. 15

VI. Post-Camp Activities . . . . . p. 16

VII. Bibliography . . . . . p. 17

I. Purposes

A. Study plant and animal life as elements of the shoreline ecology in order to understand their interrelationships.

B. Learn to locate and identify members of the shoreline community

C. Explore and observe the cycles of nature in order to understand how plants and animals are interdependent

D. To develop an appreciation of how life on the shoreline can adapt to the abrupt changes from land to marine environment

E. To learn the best ways of finding and/or collecting animals of the shoreline community.

F. To learn how to be more alert and careful observers

G. To learn how to set up and care for an aquarium

II. Scope and Sequence

A. Web of Life

B. Life Forms

1. Marine Plant Life

a. algae
b. grass
c. reed
d. sedge

2. Marine Animal Life

a. fish
b. mellusca
c. arthropoda
d. amphibia
e. collenterota
f. reptiles

3. Shoreline Visitors

The balance in nature can be seen along the shoreline very well--where the oxygen-giving plants (1) (plankton) provide the food of the mullusks (oysters and clams), insect larvae and young fish (guppy and spot). The snails feed on the algae along the stems of plants. The (3) frogs feed off the insects and may provide a meal for the (4) turtles or snakes that abound. (5) At the water's edge we find the snails and crabs consume animal and vegetable debris.

While on top of the water we find the waterfowl (wood and mallard ducks) feeding on plants (duckweed);(7) and the possible transferring of new life by (8) seeds eggs picked up and carried to new surroundings. Along the beach we find the (9) raccoon eating a meal and the (10) kingfisher looking for one.

Life along the shoreline of an estuary, such as the Camp Letts area, is unique in that it must adjust to a fluxing level of salt concentration.

Life in a Shoreline Community

III. Background Information

A. Web of Life

Ecology may be defined as the study of living creatures and their relationships to their environments. The shoreline, that narrow strip of land between the high tide mark and the low tide mark, affords the opportunity to investigate a mysterious community. The shoreline supports a high population of living species. The members of this tidal community must adapt to abrupt changes from land to marine environments. Land plants reach to the water's edge for a foothold in the sand. Water creatures invade the beaches to live under plant roots while above fly birds which are at home on land and sea.

The ecology of the shoreline at Camp Letts is affected by the surrounding watershed and by the encounter of fresh water with salt water. The type of animals found along the shoreline depends largely upon the kind of water present - fresh, brackish or salt water.

Watershed A watershed, or drainage basin, is as area of land from which a stream or river gets its water supply. The watershed may be as small as a farm or as large watershed also includes the cities, roads, people and animals. There is an interrelationship among all things, animate and inanimate, on a watershed which bears heavily on the yield of water from the land.

Estuary An estuary is where the current from a river encounters the tide from a sea. (Camp Letts is on an estuary.)

B. Life Forms

In the sea as on the land, the life-cycle is supported by sunlight. Green plants manufacture food through the process called photosynthesis. The pastures of the sea are one-celled plants called plankton. Since they contain chlorophyll they can manufacture food necessary to animal life. The herbivores of the shoreline community feed on the plankton. The carnivores then feed on the herbivores. The large carnivores may feed on smaller carnivores or herbivores. Thus, plankton is the basic food for all of these. Death and decomposition complete the cycle. The organic material of both plants and animals is subject to bacterial decay which again releases the raw materials - carbon, phosphorus, and nitrogen - needed for the process of photosynthesis.

1. Marine Plant Life

a. Algae - Any chlorophyll-containing non-flowering plant comprising the seaweeds and various fresh-water forms varying in size from a single microscopic to sometimes large and branching cell, to forms with trunklike stems many feet in length.

b. Grass - Any plant characterized by jointed stems, sheathing leaves, flower spikelets, and fruit consisting of a seed-like grain. Examples: Eel grass

c. Reed - The straight stalk of any of the various tallgrasses growing in marshy places.

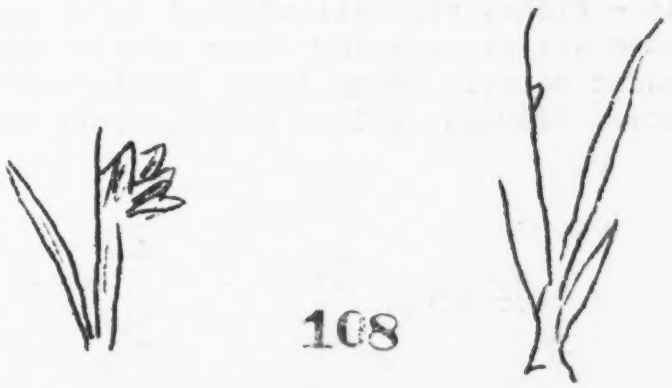
d. Sedge - Any of the various rushlike or grasslike plants distinguished by its saw-like edges. Example: Triangular sedges

Among the shoreline plant life at Camp Letts you may find the following:

Eel grass - any of several marine or sweet-water plants with ribbon-like leaves.

Glasswort - a plant found in tidal flats that is tolerable of salt-soaked soil.

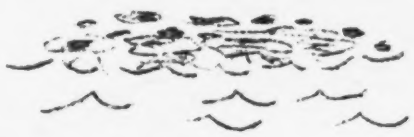
Shore rush - found in areas of brackish water with a characteristic angular stem.



Seaside goldenrod - a handsome plant having thick fleshy leaves and stout stems.

Sandbur - A hardy grass never forgotten if accidentally encountered. The sharp spines of the burs prick painfully.

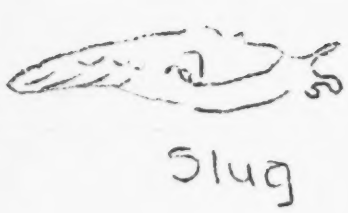
Duckweed - Asmall free-floating aquatic plant found on the surface of the water.



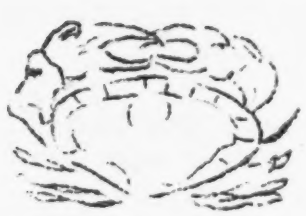
2. Marine Animal Life

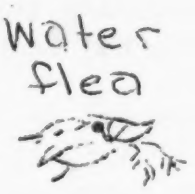
a. Fish - Fishes are well adapted to an aquatic life. Most have scales covering their bodies and breathe with gills under water. Among those sometimes found at Camp Letts are: Minnows, yellow perch, spot, eel.

b. Mollusca - Members of this large group live in the ocean, in fresh water, and on the land. Often they make a hard shell to protect their soft bodies. Among those sometimes found at Camp Letts are: slugs, oysters, clams, and snails.



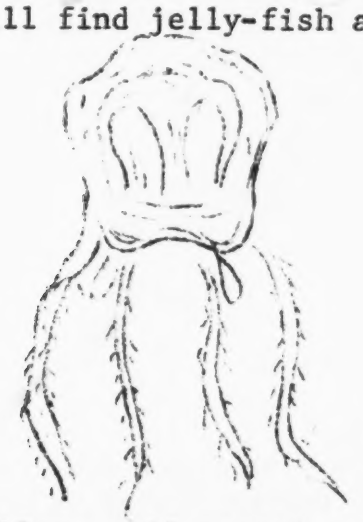
c. Arthropoda - This is a group varied kinds of animals. All have jointed legs. The largest class, Crustaceans, are found mostly in the water and breathe by means of gills. Examples found at Camp Letts include crab, crayfish, water flea, and barnacle.

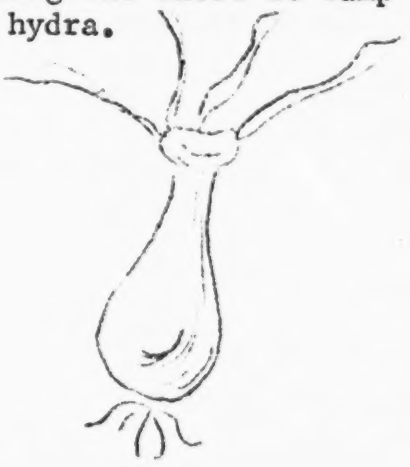




d. Amphibia - Among the amphibia are the frogs, toads, and salamanders. The word amphibia means "both life". Amphibia live the early part of their lives in the water breathing with gills and their adult life as land animals with lungs. Frogs, toads and salamanders are frequently found at Camp Letts.

e. Coelenterate - Animals in this group have one large body cavity which performs its life functions and tenticles at the end of its mouth. Along the shore at Camp Letts you will find jelly-fish and hydra.





f. Reptiles - All reptiles are lung breathers even if some of them live in water. Those that live in water come to the surface for air. Their bodies are covered with scales or bony plates. At one time this group of animals, which includes turtles, lizards, snakes, crocodiles and alligators, was the most numerous on the earth, some giant in size.

There are about ten varieties of water snakes, the largest of which is the Ugly Brown Water Snake. These snakes are only semi-aquatic. They are not venomous. Therefore, they are <u>harmless</u> even though some of them may be quite aggressive.

3. Shoreline visitors

Mammals come to the shoreline for water and to search for food. Man, too, comes for food and also for recreation. Birds come to search for food and to build homes and live in the protective surrounding of the tall grasses. Insects are found in abundance at the shoreline. The dragonfly and the scavenger beetle are busy and vital visitors. The bothersome mosquito thrives in a shoreline home. The careful observer at the edge of the water will probably see many of these visitors during his stay there.

IV. Pre-Camp Activities

A. Teacher may wish to become familiar with a shoreline before coming to camp. (Camp Letts, Calvert Cliffs, Deal Beach, Patuxent Wildlife Center)

B. Teacher and Class may do research and discuss their findings about general characteristics of shoreline plants and animals.

C. Take a field trip to acquaint children with shoreline life. (Solomons Island, Aquatic Gardens)

D. Do a mural of collage showing the balance of life along the shoreline community. (see illustration of life in Shoreline Community.) Teacher may wish to have students draw this or have them cut out pictures from magazines.

E. Set up an Acquarium. This works well when done on a individual basis using large jars or you may wish to make it a class projectand set up a large one. (See direction for setting up an aquarium.)

F. Mimic sounds and songs of animals and birds found along the shoreline. (i.e. frogs, see creative arts)

G. If there is a creek near your school, you may wish to take a hike and look for plant and animals that live on the banks. (Collecting frog eggs is a good project)

H. Many children have seashore collections. The teacher may wish to encourage them to share these in the classroom.

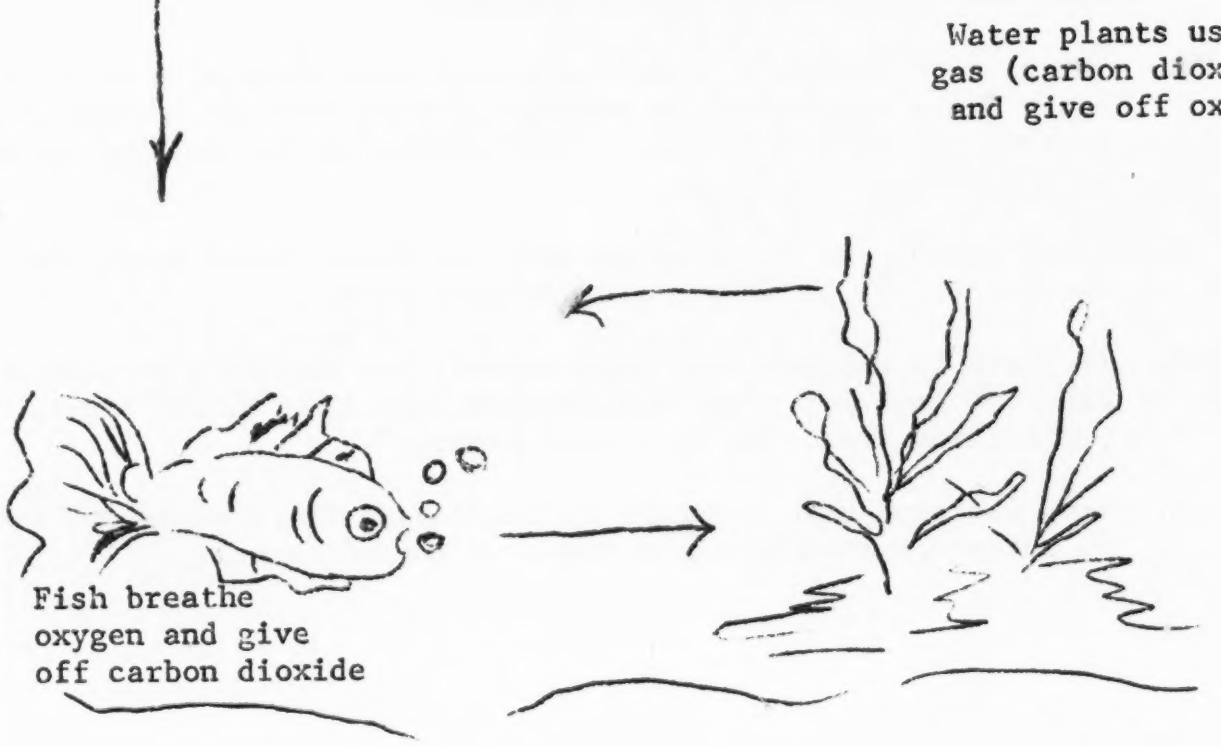
Directions for Setting up an Aquarium

A BALANCED AQUARIUM

At least 20 square inches of air surface for each inch of body length of fish.

Oxygen absorbed at air surface.

Water plants use this gas (carbon dioxide) and give off oxygen.



Fish breathe oxygen and give off carbon dioxide

PLANNING AN AQUARIUM

Equipment

1. Tank

   a. Stainless steel
   b. Marble design
   c. Brass or copper

   capacity
   2½ gallons to 20 gallons
   (for home use)

2. Stand

   a. Can be any strong material capable of supporting the aquarium.

3. Filter

   a. Inside
   b. Outside
   c. Bottom
   d. Under-gravel

   (The outside filter is recommended for beginners.)

4. Cement

   a. A well known brand of pliable aquarium cement should be kept among your aquarium supplies in case a leak develops in the seams (where glass and frame meet) of your tank.

5. Gravel

   a. It is recommended that you use gravel on the bottom of your tank. Gravel is used as a bedding for the plants in addition to adding reality to the underwater scene. Crushed rock containing no lime is suggested as the best type of gravel. Caution - Do not use sand. Sand restricts the circulation of oxygen and is a poor bed for aquarium plants.

6. Fish

   a. Local - taken from streams and ponds
   b. Tropical - taken from southern waters
   c. Goldfish - raised commercially in ponds nearby

7. Hood, Light, and Cover

   a. Stainless steel
   b. Plastic

   A stainless steel hood will project more light down into the aquarium. Light is important because it not only enhances the beauty of your aquarium but also assists in the growth of plant life. Caution - too much light will encourage the growth of algae. Approximately six hours of artificial light is recommended each day. (Small oven bulb may have a longer life.)

   A cover will greatly reduce the amount of water lost due to evaporation.

8. Plants

   a. There are many plant types available for aquarium use.. Consult your dealer for this information.

9. Food

   a. The food you use will, of course, depend on the fish in your aquarium. It is suggested that you use a floating feeding ring so as to keep the food centralized. Caution - Sprinkle food in the palm of your hand and then take small quantities between the forefinger and thumb. Deposit evenly within the feeding ring and then observe to make certain that all the food is consumed within 10 minutes.

10. Water

   a. After filling the aquarium, do not put fish in for at least two days. The reason for this two day waiting period is the fact that faucet water contains chlorine which is very harmful to fish. (Exposure to light will weaken the chlorine thereby making it harmless to the fish.)

   b. The two day waiting period can be shortened considerably by adding certain chemicals to the aquarium water. These chemicals are available at your dealer's and can be obtained in liquid or tablet form.

   c. Rule of thumb - one gallon of water for each inch of fish.

11. Ornaments

   a. Ceramic fish houses, rocks, purple clams, and many other underwater ornaments are available at your dealers.

12. Cleaning Equipment

   a. Follow your dealer's suggestions since he will know the type of aquarium you have set up.

13. Heater

   a. A heater is necessary if you wish to keep the water temperature at a certain degree. Aquarium heaters are automatic and will cut off when the desired temperature is reached. (If the heater is functioning properly.)

14. Net

   a. A net is really a necessity since the handling of fish is a delicate operation. A square or rectangular shaped net is recommended.

15. Pumps

   a. Piston
   b. Vibrating

   The type of pump you purchase will be governed by the size of the aquarium. Consult your dealer on this point.

16. Pellets

    a. Chlorine
    b. Algae
       (Please see #10 in this section and #4 in Section III)

17. Thermometer

    a. Floating
    b. Stationary
       The selection of a thermometer is governed by the type needed or desired.

Assembling an Aquarium

1. Clean Tank

    a. Wipe the interior of the tank with a cloth dampened with a weak salt solution. (Salt and water mixed.)

2. Spread Gravel

    a. Gravel should be spread so that it slopes from the rear and sides to the front. Caution - Wash gravel in weak salt solution before using.

3. Fill with Water

    a. Cover the gravel with a sheet of newspaper cut the size of the bottom of the tank. Then pour in water slowly until the tank is half full. (Note - the newspaper will rise as the water level rises.)

4. Arrange Plants and Ornaments

    a. The plants and ornaments should be arranged while the tank is half full. (Be certain that you rinse plants in a weak salt solution before placing in your tank.)

5. Install Filter, Heater, and Thermometer

6. Connect Necessary Air Hoses from Pump to Filter

7. Complete Water Filling Operation

    a. After arranging the accessories mentioned above, replace newspaper on the surface of the water and continue to fill until the water level is within ½ inch of the rim of the tank.

8. Position Hood, Light, and Cover

    a. Allow tank to stand undisturbed for approximately 48 hours. (Heater, filter, and pump should be in operation during this time.)

9. Place Fish in Water

   a. It is recommended that the water and fish (which came from your dealer) be placed in a plastic bag, and then place the plastic bag into your aquarium water until the temperature of the water in the bag equals that of the water in your tank. (Approximately 20 minutes.)

Maintenance of an Aquarium

1. Water

   a. Need not be changed if the aquarium is in balance. Maintain water level with water which has been allowed to sit in a clean (preferably glass) container for approximately 48 hours.

2. Filter

   a. Change the charcoal and glass wool when the glass wool begins to turn brown. The charcoal can be reused after washing if it is of the activated type. (Drying operation can be accomplished by placing in oven for reasonable period of time.)

   b. Wash filter case with weak solution of water and salt.

3. Pump and Motor

   a. Clean and oil regularly. Carbon tetrachloride may be used to remove all gummy oil and dirt. Be careful not to drop any oil into the aquarium or on the electrical wiring. (Oil will dissolve the rubber insulation.) Remember a drop or two of oil will do the job of lubricating your pump and motor. Caution - DO NOT OVER OIL!!!!

4. Algae

   a. If the aquarium is in balance, the appearance of algae should not occur; however, if algae should appear, the following steps may help you to remove this growth:
      1. Use less fish food. (All food should be consumed in 10 minutes.)
      2. Controlled use of light.
      3. Use of filter.
      4. Algae tablets.

5. Sand

   a. The sand should be cleaned at regular intervals. This can be accomplished by using a glass tube and squeeze bulb, vacuum apparatus which can be purchased at your dealers.

V. Camp Activities

A. Collect shoreline animals and take back to class. Teacher and class may wish to use the seining nets to catch marine life. Bring plastic containers to carry specimen; baggies as well as rigid boxes or jars.

B. Have a treasure hunt along the shoreline. Divide children into groups, provide them with a list of "treasures" and give them 30 or 40 minutes to scour the shoreline collecting. First group to return with the "treasures" is the winner. They will need a digging tool, baggies, a knapsack or grocery bag, pill jar, or other containers. The following list is rather lengthy but does include "teasures" the campers can find at Camp Letts.

You may wish to edit.

1 piece driftwood
1 crab shell
1 piece triangular sedge
1 dragonfly
2 seed pods
5 ants
3 hairs
1 worm
2 clam shells
1 gray rock
3 algae-covered rocks
1 fish
2 cattails
3 translucent pebbles
some seaweed
1 bird feather
1 frog
4 oyster shells
1 jellyfish
1 mussel shell

C. Record sounds found alongthe shoreline. Use a portable cassette recorder. (This may be compared with tape made in the woodland.)

D. Photograph the various types of life seen along the shore.

E. Do a plot study of a square yard of the shoreline. Camper should have a digging tool and pencil and notepaper. He will keep a list of all the plants and animals he sees in his pbt during a 30 or 40 minute period.

F. Collect and preserve salt water plants. Children will need pails, knife, large pan, paper, (plastic bottles with cap if the specimen is to be carried back for further study). Algae can be collected by scraping it from rocks into the water in the pail, spread it, then slip a sheet of white paper under it. Slowly raise the paper letting algae settle and the water drain off.

G. Make a model shoreline community out of a shoebox filled with sand. Specimens of actual plants and some insects may be used.

H. Collect in pill bottles samples of sand of various colors or textures.

VI. Post-Camp Activities

A. Extend the activities begun at camp; collecting, sorting, preserving specimen. Make a center to display these.

B. Make a collage with materials found along the shoreline.

C. Make shoreline animals of clay and papier mache.

D. Do finger paintings incorperating plants and/or animals the children saw along the shore.

E. Enjoy stories and poems that concern the shore. (see bibliography)

F. Write original stories, poems, limericks, or riddles that concern the shoreline community.

VII. Bibliography

A. Books

Bauer, Water; Riches or Ruin
Bishof, Sun, Earth and Man
Blough, Who Lives at the Seashore?
Cavanno, The First Book of Sea Shells
Clemons, Tide Pools and Beaches
Jackson, Seashores and Seashore Creatures
Kane, Tale of a Pond
Poole, Diving for Science
Spilhaus, The Ocean Laboratory
Zim, Seashores

B. Films (available for booking at the Materials Center)

63	Our Soil Resources	11 min.	color
313	Marine Life		
867	Natural resources from sea and sun	15 min.	color
879	The Pond	20 min.	color
1195	Life between tides	11 min.	color
1327	Erosion leveling the land	13 min.	color
1376	Camping A key to Conservation	23 min.	color
1445	Beavers at work	11 min.	color
251	Animal homes	11 min.	color
1654	Animals that live in the surf	11 min.	color
683	Aquarium wonderland	11 min.	color
2279	Animal life at low tide	11 min.	color

OUTLINE FOR THE STUDY OF WEATHER

I. Purposes . . . . . p. 1

II. Scope and Sequence

A. Ingredients of Weather . . . . . p. 1

B. Instruments . . . . . p. 2

C. Developmental patterns of weather . . . . . p. 6

D. Geographic influences on weather . . . . . p. 7

E. Effect of weather on web of life . . . . . p. 8

F. Interaction of weather . . . . . p. 8

G. Value of predicting weather . . . . . p. 8

III. Background Information . . . . . p. 9

IV. Pre-Camp Activities . . . . . p. 13

V. Camp Activities . . . . . p. 13

VI. Post-Camp Activities . . . . . p. 14

VII. Bibliography . . . . . p. 16

I. Purposes

A. To create an awareness in children of the condition of the air around us

B. To help children recognize how weather affects their daily life

C. To create an understanding of man's dependence on weather and climate as it relates to his work and his play

D. To help children understand the characteristics of weather

E. To help children understand that weather is ever-changing

F. Because weather affects anything and everything we do and have, children should understand its affects on the economy

G. To help children understand the inter-relationships that exist between all living things and weather.

II. Scope and Sequence

A. Ingredients of Weather

	Identifying Features	Unit of Measurement	Instruments Used
Wind	Speed (Velocity)	mph	Beaufort Scale Anemometer Wind Meter
	Direction		Wind Vane
Air	Weight or Pressure	inches	Mercurial Barometer Aneroid Barometer
Moisture			
Precipitation			
Rain		inches	Rain Gauge
Hail			
Sleet			
Snow		inches	
Humidity	Vapor	per cent	Hygrometer Psychrometer
Clouds	Size Shape Color Altitude	names	Cloud Chart

Temperature

Soil	degrees	Thermometer
Water	degrees	Thermometer
Air	degrees	Thermometer

B. Instruments

Wind: Beaufort Scale - First device used to determine wind velocity. Was developed by Francis Beaufort who entered British Navy at age of 13 and rose to rank of Rear-Admiral. Scale was proposed in 1805.

Anemometer - Cups may number 3 and 4 and one is colored different from the others. Odd-colored cup is the counter. Wind speed is measured in miles per hour and is determined by counting the number of rotations of odd-colored cup in thirty seconds and dividing by five.

Be selective in locating site of anemometer; surface elevation, drag and turbulence will affect accuracy.

When anemometer rotates too rapidly to be accurately counted, rely on Beaufort Scale or Wind Meter.

Wind Meter - Hold the instrument at top between thumb and middle finger, leaving the index finger free, and face into the wind. The scale of the left is the low range (less than 10 mph) and the one on the right is the high range (over 10 mph). The wind enters the two small holes near the bottom on the back of the case, and forces the white ball upward in the tube. If the wind is over 10 mph, the ball becomes lodged at the top of the tube and it is necessary to tap the instrument lightly to dislodge the ball. When this happens, place tip of index finger over the small protruding stem at the top of the instrument. (This is simlar to a damper being opened and closed on a stove pipe in order to control amount of draft.)

It is important that children learn not to blow into the instrument - pretending to be the wind. The water vapor in one's breath is blown into the tube and is absorbed by the ball causing it to expand - and then it will not move freely.

Also, when the vapor condenses, the tube wall is coated with moisture which creates friction with the moving ball.

Wind: Wind Vane - Indicates the direction from which the wind is blowing and points into the wind.

Winds are named by the direction from which they are blowing. The eight cardinal points of the compass are used with combinations when necessary for accuracy.

Compare the wind vane to an arrow, the tip of the arrow always pointing into the wind. The movement is controlled by the changing pushing of the air against the fins on the back of the arrow.

Air: Mercurial Barometer - These are not readily available, and are expensive in addition to being very sensitive. However, drawings may be used to help the children better understand the unit of measure.

A high pressure area has more weight and this weight pushes down on the surface of the mercury in the well causing the mercury in the tube to rise. When a high pressure area moves out, and is followed by a low pressure area, the weight on the surface of the mercury in the well becomes less, and allows the mercury level in the tube to fall.

Once children understand the principle of the mercurial barometer, they are able to make a quick transition to the aneroid barometer.

Aneroid Barometer - The aneroid barometer reminds children of a clock, and it is difficult for them to associate inches as a unit of measure in a circular shape (they visualize a ruler).

The face of the barometer is marked with whole number points on one side of the scale, and each whole number is divided into tenths on the opposite side of the scale. The air pressure is measured in whole number inches and tenths of inches. (Corresponding to the number of inches of mercury in a tube.)

There are two needles, or pointers, on the dial.

Air: Aneroid Barometer - One of these (the longer) has its movement controlled by changes in air pressure. The other (shorter, and usually a color other than black) is the control needle. It may be moved by turning the small, knurled knob in the center of the dial. Every time the barometer is read, this control should be moved over the other needle. The next time it is read, it is easy to see immediately whether the air pressure has: (1) remained steady - the two needles will still be aligned one over the other; (2) has fallen - the longer needle will have moved counter-clockwise toward a lower whole numeral; (3) has risen - the longer needle will have moved clockwise toward a higher whole numberal

A change in barometric pressure usually means a change in the weather is forthcoming. If it falls slowly, low pressure is approaching. If it falls rapidly, a storm is approaching.

Moisture: Precipitation - means falling moisture, and may come in the forms of rain, hail, sleet, or snow. All forms begin as cloud droplets formed on a tiny nuclei - often a particle of salt. The temperature belts (and updrafts in the case of hail) determine the form which finally reaches the ground.

Humidity - is one of the three forms of water in the atmosphere and is an invisible, gaseous vapor. Relative humidity is the amount of water vapor in air divided by the amount it could hold at a given temperature and pressure.

The psychrometer is most frequently used. It has two identical thermometers. The bulb of one is encased in a piece of white cotton (not synthetic) shoe lace. This is called the wet bulb inasmuch as the fabric is submerged in water before using the instrument. The other bulb is called the dry bulb, and every effort is made to keep it dry.

Moisture: Humidity - The instrument is whirled rapidly for about 45 turns, and the bulbs are read immediately - the wet bulb first. Repeat the process until the same readings have been obtained twice - the same wet bulb reading twice, and the same dry bulb reading twice - NOT the same reading on both bulbs.

The readings obtained from the wet and dry bulbs are used with charts to determine the relative humidity and dew point.

Clouds - Cloud Charts are available for use in identifying formations and their probable effects.

Stratus are the lowest clouds.

Nimbus are the rain clouds.

Cumulus are puffy, cauliflower-like shapes which are constantly changing.

Cirrus are thin, wispy, feathery strands (sometimes called mares' tails) and are composed entirely of ice crystals.

Temperature: Fahrenheit scale thermometers are used and all except the soil thermometer are in 1 degree gradations. The soil thermometer is a 2 degree gradation.

Thermometers should be shielded from direct sun rays, and children should be taught (through illustration) never to hold the bulb of a thermometer.

Soil thermometer has a brass tip in order to penetrate the earth. Use this thermometer to teach what happens, and how quickly body heat is transferred when the bulb is held in the hand.

Water thermometer is a regular thermometer fitted into a special container. The container is lowered into the water to the desired depth. The cord used in lowering the container is knotted at 1 foot intervals.

Temperature: Air thermometers are available in two types. The dry bulb reading of the psychrometer is always the current air temperature.

Maximimum-Minimum thermometers are available. The thermometer has a U-shape, and the scales are reversed - the coldest reading at the top on one side. Each side of the U contains a black magnetic marker. When the temperature rises, the mercury goes up on the Heat side and pushes the magnetic marker upward. When the air temperature cools, the mercury falls on the Heat side and rises on the Cold side, leaving the magnetic marker in place until it is pulled down to mercury level with a small magnet. Always read the bottom of the magnetic marker to obtain the maximum high for the day and the minimum low for the night.

C. Developmental patterns of weather

1. Expect Poor Weather, rain or snow when:
   Barometric pressure is falling, wind is generally from the south, or east of the north-south line, clouds become heavy and dark, and lower clouds move in from the south or east.

2. Expect Fair Weather when:
   Barometric pressure is rising. Wind is generally from north or west. Skies are clearing, clouds becoming higher and thinner.

3. Expect Continuing Fair Weather when:
   Barometric pressure remains steady or rises, fog disappears in the morning, dew or frost appear on the ground at night.

4. Expect Colder Weather when:
   Barometric pressure is rising in the winter, wind shifts to the north or west, sky is clear at night and wind is light.

5. Expect Warmer Weather when:
   Wind shifts to south, sky changes from clear during the day to cloudy at night.

6. Expect Fog, Frost, or Dew when:
   Relative humidity is high on a clear and calm night.

7. A halo around the sun indicates an advancing warm front, which usually brings rain.

8. Warm air holds more moisture than cold air. If there is a sharp rise in moisture and the air temperature remains the same, this is a key symptom of coming rain. Conversely, if there is a sharp drop in temperature and the humidity holds steady, the prognosis is possible rain.

9. As the gap between air temperature and dew point temperature closes, the likelihood of rain is positively increased. Of course, if the temperature is sufficiently low, the form of precipitation may be sleet or snow.

10. Sample forecast/report form:

_____, 19____
Date

This is the latest weather report for our area. The temperature at _____ was _____degrees. The wind is _____ at _____ miles per hour and is _____. The barometer was _____ inches and _____. The sky was _____with _____. The relative humidity was _____percent. Dew point temperature was _____degrees. Soil temperature was ____ degrees. Water temperature was _____ degrees. The maximum high for _____ was _____degrees, and the minimum low for last night was _____degrees.

The prediction is _____

_____

_____

School: _____Teacher:_____

Children: _____ and _____

D. Geographic influences on kinds of weather

1. The rotation of the earth results in uneven heating. This causes uneven heating of the air above it, so all around the earth are parcels of air - big and small - with different temperatures.

2. The air near the equator is lighter because of its temperature, and heavier cold air sinks and pushes up the lighter warm air. This accounts for different wind belts over the earth.

3. The prevailing winds where we live are from the west. Most of the snow storms in the midwest are deflected to the northeast by the mountains - and this is why many do not reach our local area.

4. Because of the differences in heating and cooling of land and water, and the large areas of water adjacent to us, predicting for our areas is more difficult.

E. The effect of weather on the web of life

1. Spring is the time of birth for nearly all types of plant life, as well as many forms of animal life. Weather factors during this season of the year are conducive to growth.

2. Summer is the time for growing to maturity for nearly all types of plant life, as well as many forms of animal life. Weather factors during this season of the year are conducive to continued growth and maturing.

3. Fall is the nearest season of the year for many types of plant life - especially those on which man depends.

4. Winter is the time of rest for many types of plant and animal life.

F. Interaction of weather, living things, and the environment

1. The water cycle in the atmosphere provides the moisture and many of the nutrients required by plant life, which in turn, provide the nutrients for animal life.

2. The eroding effects of freezing and thawing aid in building soil on which plant life depends.

3. As the life cycle ends for many forms of plant and animal life, they return to the earth and their remains are returned to the soil through bacteria action - and this too, is affected by the weather.

4. There is an interdependence of weather, living things, and the environment. Any two of the three react on, and affect the third.

G. Value of predicting weather changes

1. Types of clothing needed during camping session.

2. Amount of bedding needed during camping session.

3. Kind of activities which may be pursued in different kinds of weather.

Canoeing	Hiking	Fire-building	Cook-outs
Swimming	Astronomy	Camp Fire	Viewing Films
Poetry	Songs	Nature Crafts	Collecting

III. Background Information

A. Cloud Formations - Classification and Name

Type 1: Clouds formed by rising air currents. They are piled up and fluffy. The word "cumulus" means piled up or accumulated.

Type 2: Clouds formed when a layer of air is cooled below the saturation point without vertical movement. They are in sheets or foglike layers. The word "stratus" means sheetlike or layered.

Clouds are also classified by altitude into four families: high, middle, low and towering clouds. The bases of towering cloudsmay be as low as typical low clouds, but the tops may extend vertically to or above 75,000 feet.

Nimbus: means rain cloud and is added to the names of other clouds which produce rain or snow.

Fracto: means fragment and is added to names of wind-blown clouds which have been broken into pieces.

Alto: means high, and indicates middle-layer high clouds of stratus or cumulus types.

B. High Clouds: composed almost entirely of tiny ice crystals; bases average 20,000 feet above the earth.

1. Cirrus: Clouds are thin, wispy, feathery and are composed entirely of ice crystals. Usually form at 25,000 feet and above.

2. Cirrocumulus: Thin, patchy clouds forming wavelike patterns. Form at 20,000 to 25,000 feet and are rarely seen. These are the true mackerel sky, and should not be confused with altocumulus rolls. They are always too thin to show shadows.

3. Cirrostratus: Clouds are made of ice crystals, and form at same altitudes as cirrocumulus. They are thin sheets which look like thin, fine veils or wind-blown patches of gauze. They form large halos around the sun and moon.

C. Middle Clouds: Bases average 6,500 feet above earth, and are basically stratus or cumulus.

1. Altostratus: Dense veils of gray or blue appearing fibrous or lightly striped. Sun or moon does not form a halo, but appear as though viewed through frosted glass.

2. Nimbostratus: The true rain cloud is darker than ordinary stratus, having a wet look, and streaks of rain often extend to the ground. When the wind is strong, low fractostratus clouds usually acccmpany.

3. Stratocumulus: Irregular masses spread out in rolling or puffy layers. They are gray, with darker shading, but do not produce rain unless they change into nimbostratus. Then the rolls fuse and the lower surface becomes indistinct with rain.

E. Towering Clouds: Clouds of vertical development which result from strong vertical currents. May form at almost any altitude - bases are sometimes as high as 14,000 feet.

1. Cumulonimbus: Bases may almost touch the ground, but violent updrafts may carry the tops to 75,000 feet. These are the familiar thunderheads. Winds aloft often mold the tops into flat, anvil-like forms. The most violent forms of these clouds produce tornadoes.

2. Cumulus: The powder-puff cloud shapes are constantly changing. Over land, they usually form by day in the rising warm air, and disappear at night. They generally mean fair weather.

F. Changes in barometric pressure

Rising Barometer

29.	to 29.3	Clearing with high winds and cool wave
29.3	to 29.6	High winds with cool wave preceded by squalls
29.6	to 29.9	Fair with fresh winds tonight and tomorrow
29.9	to 30.2	Fair with brisk winds tonight and tomorrow
30.2	to 30.5	Generally fair weather probably cool today with variable winds
30.5	to 30.8	Clear weather tonight and continued cool with moderate winds
30.8	to 31.	Southeast rains with high winds

Falling Barometer

31.	to 30.8	Fair, cool, variable winds
30.8	to 30.5	Fair and warmer, followed by wind and rain, or snow, after one or two days
30.5	to 30.2	Storm developing in the direction in which the wind is blowing
30.2	to 29.9	Cloudy and warmer, with unsettled weather rain or snow
29.9	to 29.6	Unsettled weather, increasing winds and warmer
29.6	to 29.3	Clearing. Slight squalls, fair and warmer tomorrow
29.3	to 29.	Clearing weather, high winds accompanies by squalls, and cooler
29.	to 28.7	Stormy

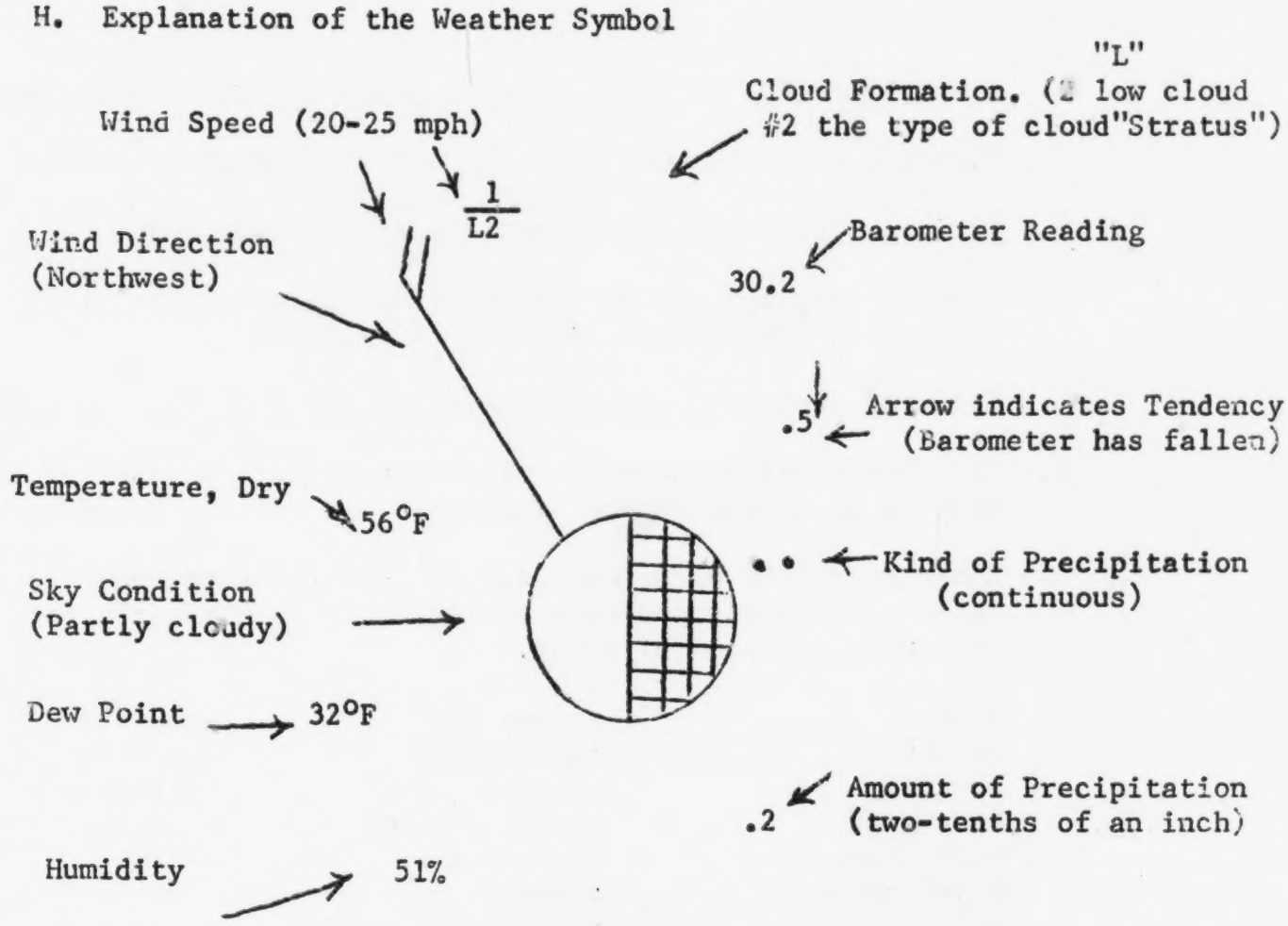
G. Beaufort Wind Scale Chart

Wind - Even without an instrument you can make accurate estimates of the wind speed by watching its effect on things around you.

HOW TO JUDGE WIND SPEED

IF	The Wind Is	The Speed In Miles Per Hour Is	Beaufort Number
smoke rises straight up	Calm	Less than 1	0
smoke drifts in the wind but wind vanes do not turn	Light Air	1 to 3	1
you feel the wind on your face, leaves rustle and wind vanes move	Light Breeze	4 to 7	2
the wind extends a little flag and keeps leaves and small twigs in motion	Gentle Breeze	8 to 12	3
wind raises dust and loose paper and small branches are kept in motion	Moderate Breeze	13 to 18	4
the wind sways small trees and leaves, and little white wavelets form on ponds and lakes	Fresh Breeze	19 to 24	5
large branches of trees move, telephone wires whistle, and it is hard to use an umbrella	Strong Breeze	25 to 31	6
whole trees bend, and it is hard to walk against the wind	Moderate Gale	32 to 38	7
twigs break off the trees	Fresh Gale	39 to 46	8
chimneypots are blown off houses and roofs are damaged	Strong Gale	47 to 54	9
whole trees are uprooted	Whole Gale	55 to 63	10
damaged is very widespread	Storm	64 to 75	11
tremendous damage and loss of life is caused	A Hurricane	above 75	12

H. Explanation of the Weather Symbol



Note: Please remember that these symbols have been greatly enlarged for easier explanation HOWEVER, they must be reduced in size to accomodate the Weather Map.

IV. Pre-Camp Activities

A. Discuss the effect of weather in preparing for camping activity.

B. Maintain a Weather Calendar for a period prior to camping session.

C. Observe, identify, and illustrate cloud formations.

D. Locate, display, and discuss pictures illustrating kinds of weather or the effects of kinds of weather.

E. Collect, identify, and categorize pictures of forms of precipitation.

F. Assemble a kit, either for classroom or individuals, of instruments used in measuring weather factors. Kit will be taken to camp.

G. Children should have knowledge of some terms in order to accomplish tasks effectively and gain satisfaction from their efforts. The following are some of these.

wind	anemometer	Beaufort scale
moisture	thermometer	velocity
humidity	cloud	hygrometer
barometer	precipitation	atmosphere
rain gauge	dew point	current
psychrometer	cumulus	convection
air	nimbus	climate
relative humidity	stratus	weather
pressure	cirrus	conduction
storm	hurricane	front

H. Photograph cloud formation.

I. Using colored construction paper and chalk, go outside and draw clouds. This can be on-going, allowing the child to have a collection of drawings showing the most common clouds that appear in this community.

J. Take ground temperature at various places around the school.

K. Research and discuss myths pertaining to weather phenomena which early man did not understand, but did try to justify.

L. Children make a chart of weather superstitions and discuss the fact or fiction aspects of each.

M. Simple instruments may be made by the children. Directions and materials needed may be found in the blue paper booklet prepared by Jerry Keeney called simply "Weather Booklet" or in Science in our World published by D.C. Health Company.

V. Camp Activities

A. Make periodic reports of ground conditions

B. Record data on weather chart to observe trends and predict changes

C. Observe and identify cloud formations.

D. Learn to use Beaufort Scale in determining wind velocity while engaged in any camp activity.

E. Compare wind direction at ground level with wind direction in upper atmosphere by observing the direction of cloud movement. (This may be demonstrated very well with the launching of model rockets.)

F. Take water temperature at various places around camp.

G. Take a hike looking for signs of weathering...their effect on shore, trails, around buildings, exposed soil etc.

H. Take ground temperature at various places around camp (field, shoreline, by campfire, deep woods, along road).

I. Develop an appreciation for the impact, influence, and effects of weather during all camping experiences. A few examples are:

Water front: White caps develop as wind increases. Swimming is prohibited until water is sufficiently warm. Canoeing is dangerous when wind develops rough water.

Nature trail: Effects of drought and/or rain on plant life.
Condition of soil related to recent precipitation.
Tree damage resulting from ice, snow, or lightning.

Ecology: Eroding effects of heavy rainfall.
Fissures developed from drought.
Dependence of plant and animal life on water supplied by rain.
Abundance and/or lack of plants in high, well-drained or swampy areas.

Camp Crafts: Dryness of forest floor and danger of fire when there has been little or no precipitation.

Insect Study: During periods of precipitation, many kinds of insects are difficult to find - while others are more available.

Stalking: Animal tracks are difficult to see when ground is dry. Tracks can be washed away by heavy rain.

J. Alternate camp experiences in the event an indoor activity is necessary should include several films, requisitioned in advance, to use in developing or increasing an awareness of the influence of weather and seasons on our ways of living.

VI. Post-Camp Activities

A. Operate a weather station at school. Record and chart data to be used in understanding trends.

B. Exchange weather data with another school to see the differences in a small geographic area.

C. Construct instruments and encourage children to operate a small station at home to see similarities and/or differences within a school community.

D. Obtain copies of the official weather maps from the Weather Bureau and use them to see daily changes--particularly in frontal movements.

E. Take ground temperature in various places around the school, blacktop, kitchen door, flag pole, etc.

F. Field trips to the Weather Bureau are available.

G. Invite a resource person to talk about weather--one who has a background of knowledge for the weather satellite program or one who uses audio-visuals to suppliment a discussion would be stimulating.

VII. Bibliography

A. A V Materials - Films

62 Water Cycle
1071 Causes of the Seasons
549 Climate and The World We Live In
1332 Climates of North America
1905 Clouds
309 Clouds Above
1197 Concert for Clouds
1228 Let's Learn to Predict The Weather
1457 Ocean Currents
1070 Origins of Weather
254 Our Weather
1729 Rain
1730 Rainshower
1742 The Seasons of The Year
1477 Snow
2067 Snowflakes
1599 Spring Brings Changes
1007 Spring Comes Again
537 Story of A Storm
1602 Thermometer: How We Use Them
574 Unchained Goddess, The
1466 Ways To Find Out: Rainy Day
1449 Weather For Beginners
1072 Weather: Understanding Precipitation
1078 What Causes The Seasons
1978 Whatever The Weather
1330 What Makes Clouds
1331 What Makes The Wind Blow

B. A V Materials - Tapes

T - 229 Reading The Weather
232 Storm Warner
246 How Can We Measure Heat, Part I
247 How Can We Measure Heat, Part II
284 Nimbus, The Weather Watcher
560 The Invisible Ocean
85 The Ocean and Our Weather
196 Barometer
197 Clouds
198 Cyclones
200 Give Me Air
201 Hurricanes
202 Predicting Weather
203 Rain, Snow, Sleet
204 Sun
319 Let's Call The Weatherman
346 Snow
195 Air Around Us
391 What Is A Season: How Weather Affects Us
417 Watershed

C. A V Materials - Transparencies

Transparencies may be made at the Materials Center using the originals on file there.

General Science: (3M Original Packet)

Effect of Heat on Land and Water; Air Masses
Development of Low Pressure Area
Weather Map Showing Fronts, Lows, and Isobars

Biology: Ecological Aspects (3M Original Packet)

Water Cycle

Weather: (3M Original Packet)

The Atmosphere
Composition of Dry Air by Volume in the Troposhere
Heat and Its Transfer
Air Pressure
World Wide Circulation of Air
Dew Point
Lapse Rates
Cloud Types
Types of Precipitation
Major Air Masses
Stationary Front
Cold Front
Warm Front
Occluded Front
Development of Low Pressure Areas (cyclones)
Thunder and Lightning
Violent Storms
Jet Streams Effect on Weather
Weather Prediction
Evaporation
Condensation
There Are Three Basic Cloud Formations
Precipitation
Lightning and Thunder May Accompany Rain
Weather Instruments
Weather Maps Tell Us About the Weather
Let's Make Our Own Weather Map

The Earth: (3M Original Packet)

Atmosphere of the Earth
Seasons
Spring
Summer
Fall
Winter

Note: Many commercially prepared transparencies - complete with overlays - are available and approved for purchase in the A V Instructional Materials allotment.

D. Books

Fenton, Carroll Lane and Mildred. Our Changing Weather. New York: Double Day & Company, 1954.

Gaer, Joseph. Everybody's Weather. Revised. Pennsylvania: J. B. Lippincott Company, 1957.

Parker, Bertha M. The Air About Us; All About Weather; Ask The Weatherman; The Ways of Weather. Basic Science Education. New York: Harper & Row, Inc.

Tannehill, Ivan Ray. All About Weather. New York: Random House, Inc., 1953.

Thompson, Philip D. and O'Brien, Robert. Weather. New York: Time, Inc., 1965.

Schneider, Herman and Nina. Science In Our World.

Zim, Herbert S. Weather. New York: Simon and Schuster, 1957.

E. Records

Weather Songs

F. Weather Books in Elementary Libraries (#552)

Adler, I.	Hurricanes and Twisters
Adler, I.	Storms
Adler, I.	Weather In Your Life
Blough, G.	Not Only For Ducks
Courtney, W.	What Does A Barometer Do
Fenton, C.	Our Changing Weather
Feravolo, R.	Weather Experiments
Gallant, R.	Exploring The Weather
Harris, M.	Man Against Storm
Hitte, K.	Hurricanes, Tornadoes And Blizzards
Larrick, N.	Junior Science Book of Rain, Hail, Sleet and Snow
Lehr, P.	Storms
Lehr, P.	Storms
Schneider, H.	Everyday Weather And How It Works
Spilhaus, A.	Weathercraft
Tannehill, I.	All About The Weather

OUTLINE FOR THE STUDY OF ASTRONOMY

I. Purposes . . . . . p. 1

II. Scope and Sequence . . . . . p. 1

III. Background Information

A. Web of Life . . . . . p. 2

B. The Universe and Our Solar System . . . . . p. 2

1. The Sun . . . . . p. 2

2. The Stars . . . . . p. 2

3. The Planets . . . . . p. 4

4. The Earth . . . . . p. 6

5. The Asteroids, Comets, Meteors and Meteorites . . . . . p. 6

IV. Pre-Camp Activities . . . . . p. 7

V. Camp Activities . . . . . p. 16

VI. Post-Camp Activities . . . . . p. 17

VII. Bibliography . . . . . p. 18

I. Purposes

A. Develop an awareness of the importance of the sun to Man's environment

B. Learn to locate and identify members of the Solar System

C. Gain an understanding of the magnitude of our Solar System and that the position of the earth within that system determines our natural environment

D. Recognize that our Solar System is but a small part of a much larger system called the universe.

E. Observe and identify various stars and constellations seen in the night sky

F. Understand that the moon, because of the gravitational force that it exerts, affects life on earth.

II. Scope and Sequence

The amount of material in this area and the depth into which it will be covered will have to be determined by the teacher. A limited dimension and suggested outline for the study of astronomy is presented here.

A. Web of Life

B. The Universe and Our Solar System

1. The Sun

a. Importance to earth
b. Size and Temperature
c. Position in the universe
d. Position in the Solar System
e. Composition

2. The Stars

a. Characteristics
b. Constellations
c. Telling time by the Stars

3. The Planets

a. Names and Order from the Sun
b. Revolution and Rotation
c. Natural Satellites
d. Characteristics

4. The Earth

   a. Position in Space
   b. Existence of Life
   c. Rotation
   d. Revolution
   e. Natural Satellite

5. The Asteroids, Comets, Meteors and Meteorites

   a. Asteroids
   b. Comets
   c. Meteors
   d. Meteorites

III. Background Information

A. Web of Life

The Sun is the most important factor in our environment. Without the sun's heat and light, man, animals and plants could live and grow. The earth is so small and so far away from the sun that it receives only about one two-billionth part of the sun's emitted heat and light. Yet this extremely narrow beam of energy is the difference between a dark, dead world and the warm, beautiful earth of color, light and life that we all know and must learn to preserve.

B. The Universe and Our Solar System

1. The Sun

   a. The source of light and heat energy for the earth.

   b. A medium sized yellow star. The Sun is a glowing incandescent gas with an outside temperature of approximately 11,000 degrees Fahrenheit, and a probable inside temperature of approximately 36,000,000 degrees Fahrenheit.

   c. A star in the Milky Way Galaxy. It is located at the edge of the Milky Way Galaxy.

   d. The center of our Solar System. The average distance of the sun from the earth is 92,956,000 miles.

   e. Composed mainly of hydrogen. Every second about 700 million tons of hydrogen turns into helium. Each helium atom is made of the matter that was in four hydrogen atoms. But a small particle of that matter is missing. It has been converted into energy.

2. The Stars

   a. Differ according to size, color and distance from the earth.

1) Size - determines the amount of heat and light energy given off. Beteleuse in the constellation Orion, is more than a million times as big as our sun.

2) Color-tells the age and temperature of a star.

red----------yellow----------blue-white
(5,000 degrees) (40,000 degrees F.
old star new star

The brightness of a star is called magnitude.

3) Distance - Our Sun is the closest star to the earth. The next nearest star is over four light-years away. (A light year is the distance light traveling at the speed of 186,000 miles per second will travel in one year.) This star is Proxima of Centaurus. Sirius, the Dog Star, is 8 1/12 lightyears away.

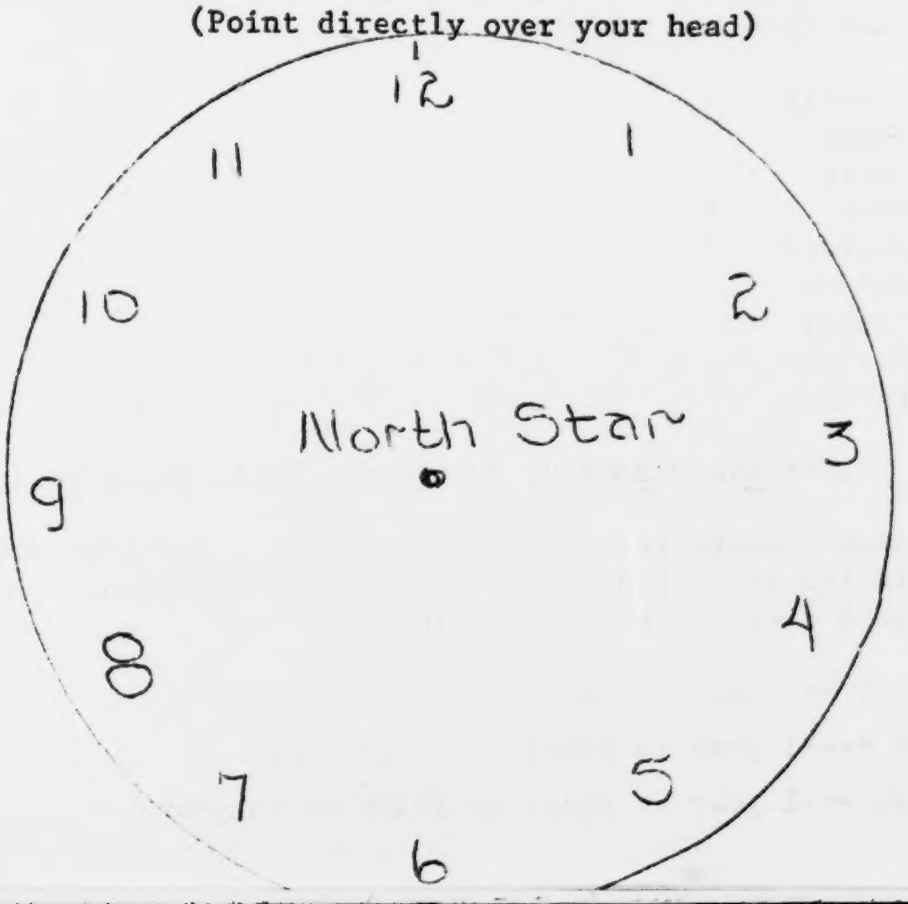
b. Groups of stars form patterns in the sky. We call these patterns constellations. There are 88 constellations in all. The position of some constellations because of their apparent motion can be used to tell time.

c. How To Tell Time By The Stars

The 24 hour clock

Material: Master drawing of Sky Clock, Pencil

Zenith
(Point directly over your head)



1. Point the center of your clock at the North Star. The "12" points to your zenith (point directly over your head).

2. Locate the Big Dipper and draw it on your clock exactly the way you see it in the sky.

3. Draw a line from the North Star through the Pointer stars in the Bowl of the Dipper (see example) to the edge of your clock.

4. The number indicated should be rounded to the nearest ½ hour.

5. Count the number of months that have passed from March 7th to the present date (round up to the nearest quarter).

6. ADD this to the number indicated by the hour hand of the sky clock (see figure).

7. Multiply this number by "2".

8. Subtract this number from 24, or from 48 if the number is greater than 24.

9. This is the correct time in hours. (See 24 Hour Clock)

10. If this number is between 1 and 12, it means that the time is in the a.m.

11. If the number is greater than 12, it means that the time is in the p.m.

3. The Planets

a. There are nine known planets in our Solar System. Their names in order from the sun are:

1. Mercury
2. Venus
3. Earth
4. Mars
5. Jupiter
6. Saturn
7. Uranus
8. Neptune
9. Pluto

"Matilda Visits Every Monday, Just Stays Until Noon, Period."

b. All nine planets revolve around the sun. The time for one revolution is called a year. It varies depending upon the planets distance from the sun. Example:

Mercury --1 year is equal to 88 earth days

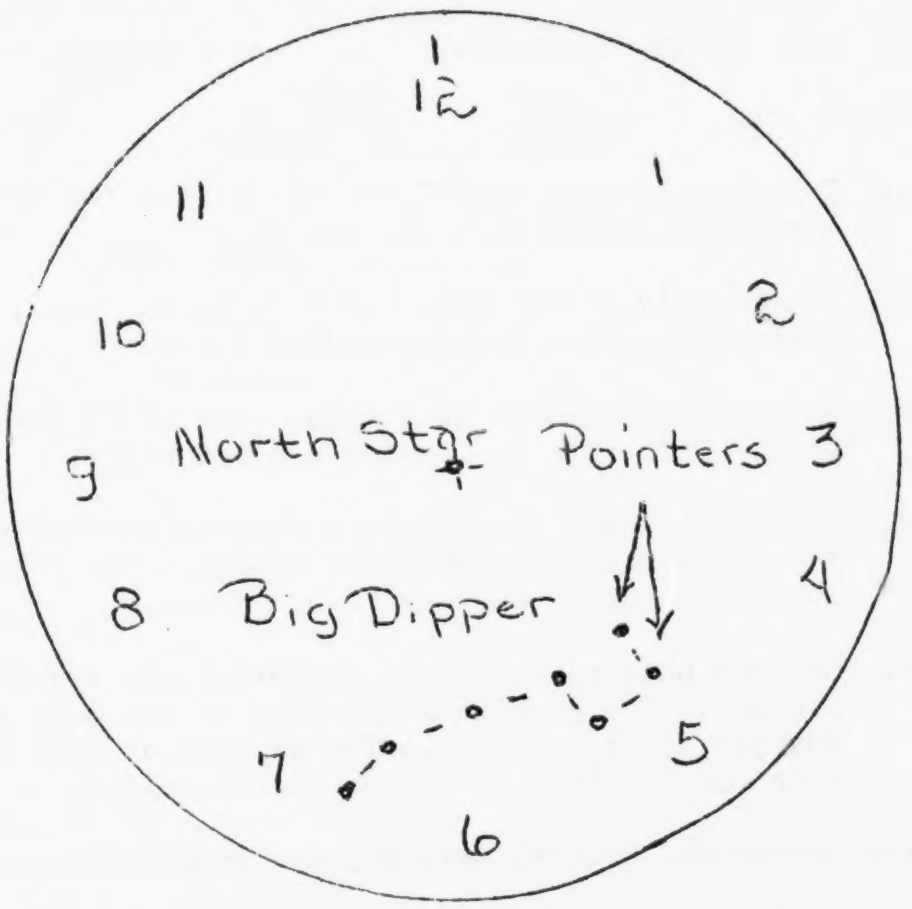
Earth ----1 year is equal to 365.3 days

Saturn ---1 year is equal to 29.46 earth years

The 24 Hour Clock

Morning				Afternoon			
0100	1	0700	7	1300	1	1900	7
0200	2	0800	8	1400	2	2000	8
0300	3	0900	9	1500	3	2100	9
0400	4	1000	10	1600	4	2200	10
0500	5	1100	11	1700	5	2300	11
0600	6	1200	12	1800	6	2400	12

Example:



1. From March 7 to Sept. 15 equals 6½ months to the nearest quarter.
2. In Fig. 1 the hour hand points to $5.6\frac{1}{4} + 5 = 11\frac{1}{4}$
3. Multiply: $11\frac{1}{4} \times 2 = 22\frac{1}{2}$
4. Subtract: $24 - 22\frac{1}{2} = 1\frac{1}{2}$ ($22\frac{1}{2}$ is less than 24)
5. Since $1\frac{1}{2}$ is less than 12, $1\frac{1}{2}$ = 1:30 A.M.
6. The time of observation is 1:30 A.M.

The planets also exhibit equatorial rotation. The time for one complete rotation around the axis is called a day. The time varies from one planet to another.

c. Some planets have natural satellites (moons) orbiting around them. Example:

Earth has one moon
Mars has two moons
Jupiter has twelve moons

d. Planets differ according to size. The smallest is Mercury (approximately 3,010 miles in diameter). The largest is Jupiter (approximately 86,900 miles in diameter).

Other physical differences in the planets exist but will not be expanded here.

4. The Earth

a. Is approximately 93,000,000 miles from the sun. It is the third planet from the sun.

b. Is the only planet known to have life. Land, Air and Water life exist in many varied forms.

c. Rotates on its axis in a total time of 23 hours, 56.1 minutes. This rotation causes day and night.

d. Revolves around the sun on a slanted axis which is one of the factors causing seasonal change. One complete revolution measures one year (365.3 days).

e. Has one natural satellite approximately 238,000 miles distant. The gravitational pull of the moon is responsible for the tides on earth. The section of land between high tide and low tide is called the shoreline.

5. The Asteroids, Comets, Meteors, and Meteorites

a. Asteroid - barren chunks of rock found between the orbits of Mars and Jupiter.

b. Comets - glowing mass of gas and dust particles in eliptical orbit around the sun.

c. Meteors - large and small chunks of matter that bombard the earth and burn up in its atmosphere.

d. Meteorites - those meteors that survive the earths atmosphere and strike the surface.

IV. Pre-Camp Activities

A. Construct a spectroscope

The spectroscope is an instrument which is really a "sorting out" device. The spectroscope takes light which is composed of numerous different colors and sorts out the various colors in the order of their wavelength. In visible light, the colors range from red light with a very long wavelength, to violet with a very short wavelength. All of the other colors fall in between these two, and they tend to blend into each other.

The spectroscope has many uses. One of the most important for the astronomer, however, is the spectroscope's ability to identify chemical elements. Through the use of this "finger-printing machine", astronomers have been able to determine the composition of the sun, stars and the atmospheres of several planets. Because of its usefulness, the spectroscope will be placed in space often to aid in analyzing the chemical composition of the areas visited by the NASA spacecraft.

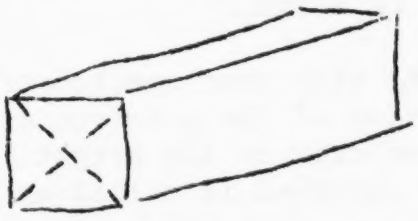
Materials: Each child will need

a. masking tape, 3/4 - 1 inch wide
b. shoe box with its top
c. 2 single edged razor blades
d. transmission diffraction grating (this can be purchased from Edmund Scientific Company, Barrington, New Jersey, Catalog Number 50.180.)
e. compass with pencil
f. ruler

Extreme CAUTION should be used in working with RAZOR BLADES.

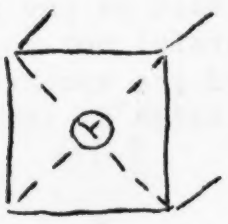
PROCEDURE:

1. Locate the center of each end of the shoe box. The easiest and quickest way is to draw two diagonals. The intersection of these lines is the center of the end of the shoe box.



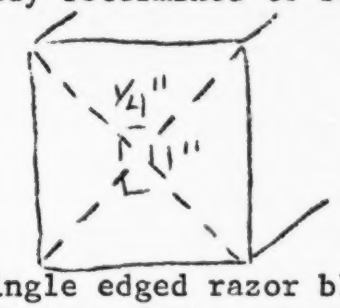
Do this to both ends

2. At the center on one end of the shoe box, draw a circle, using a compass with a ½ inch radius.



3. Cut the circle out with a single edged razor blade. This will be the eyehole.

4. Exactly opposite the eyehole, cut a narrow vertical slit with the single edged razor blade. The slit shoudl be approximately 1" X ½". Therefore, the slit should extend ½" above and below the point already determined to be the center.



5. Tape the two single edged razor blades inside the box over the slit (sharp edges facing one another). The sharp edges should form an opening between 1/16" and 1/32" of an inch.

6. On the inside of the box, over the eyehole, tape the transmission diffraction grating so that the fine lines on the grating run parallel to the slit.

7. Place the lid back on the shoe box, and tape it around the edges to keep out unwanted light.

Your spectroscope is now ready to use. Remember, NEVER look directly at the sun, even through the spectroscope.

Activities for the Spectroscope

Look at the light from an ordinary light bulb with your spectroscope. While looking at the light, you should observe the following colors through your spectroscope--violet, green, blue, red, yellow, indigo and orange. Arrange the colors in the order you see them in your spectroscope from left to right.

This is an example of a continuous spectrum. The spectrum from the light bulb is very similar to the sun's spectrum. NEVER LOOK AT THE SUN DIRECTLY. IF YOU WANT TO SEE THE SUN'S SPECTRUM, LOOK AT SUNLIGHT REFLECTED OFF A WHITE PIECE OF PAPER.

Look at a flourescent light with your spectroscope. Do you see the bright lines? In which section of the spectrum are they located? Make a drawing of the spectrum and draw in the bright lines. The type of spectrum that you have just observed is called an emission-line spectrum.

The flame from a bunsen burner, candle, or alcohol lamp can be used to observe the emission-line spectra of other elements. Take some table salt (NaCl) and add just enough water to dampen it. With a piece of cotton soak up as much salt as you can on the cotton. Then with a pair of forceps (being careful not to get burned) hold the piece of cotton over the flame. Record the spectral lines observed. Are the bright lines in the same location as those observed in the flourescent light in Step 2?

B. Learn to Calculate degrees by using the "fist sextant"

The "fist" is the measuring stick. One "fist width" (from knuckle to knuckle) is equal to 10 degrees. The fist is held in front of you at eye level. This is your horizontal position. Count the number of fists from this point to a point directly above your head (zenith point). You should count nine fists. How many degrees is this? From the horizontal to your zenith is 90°.

Your fist sextant can be used to determine the altitude of the sun anytime during the day.

Use your fist sextant to measure the altitude of Polaris, the North Star, this will give your latitude.

Measure the distance between the pointer stars of the "Big Dipper". Your answer should be approximately 5°.

By using your sextant horizontally, you can determine the Azimuth of a star. The Azimuth of a star is its angular distance from the north. Determine the Azimuth of several stars or planets as practice.

C. Construct a Simple Star Finder

Star finders are "telling time" devices. The simple star finder can be used to show the apparent motion of stars around the North Pole Star during one day. The earth turns almost one full turn each day.

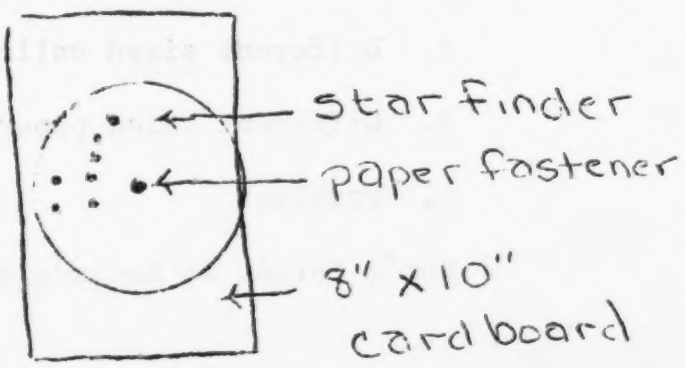
A more complicated star finder can be used to show the asterisms, Little Dipper and Big Dipper and the "W" (Cassiopeia) as circumpolar. In order to teach the "telling of time" by the Dippers, The month and hour of observation can be set on the finder and the real sky observation can be determined.

Materials: Each child will need

Master drawings of star finders to duplicate for each child.
8 x 10 inch piece of cardboard and glue
Paper fastener, to allow circle to turn

PROCEDURE:

1. Cut out circle representing the circumpolar stars.
2. Glue circle on cardboard.
3. Punch hole at North Star.



4. Put paper fastener in hole and attach circle to 8" x 10" cardboard.

5. Hold on to the 8" x 10" cardboard with one hand and turn the circle counterclockwise with other hand to show how stars <u>appear</u> to circle around the North Star.

The simple star finder can be used to show:

1) Motion around the pole of the sky.

2) North Star as pole star.

3) Circumpolar stars are stars that never rise or set below the horizon.

The more difficult star finders can be used, in addition to the above:

1) To set the stars for a specific time and date for study previous to real sky observation.

2) To study position of circumpolar constellations for each season.

3) To determine which constellations are circumpolar.

An old umbrella makes a very nice large Star Finder.

Commercial star finders may be purchased from:

Edmund Scientific Company
101 East Gloucester Pike
Barrington, New Jersey 08007

D. <u>Construct a model of the Solar System using</u>

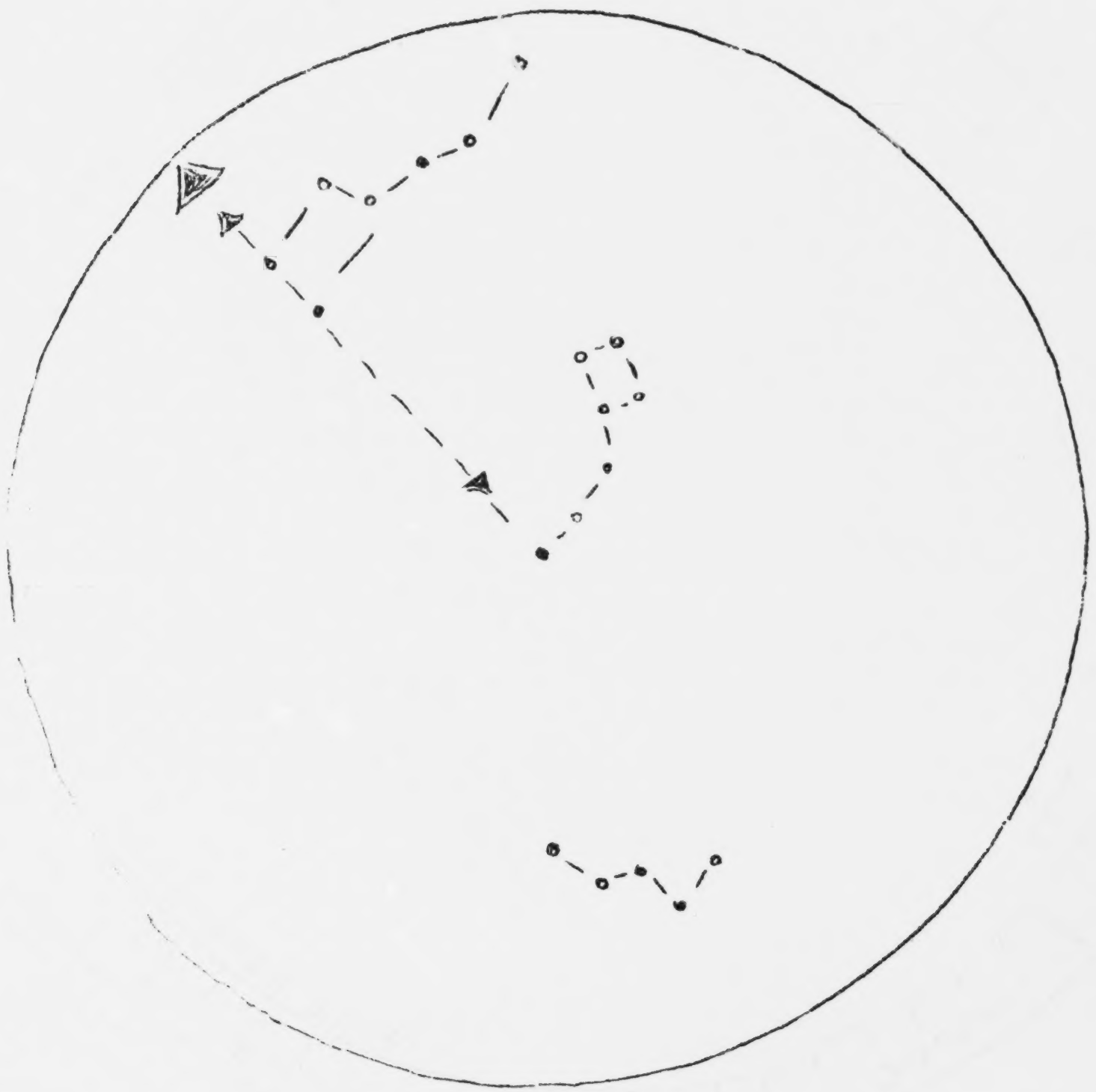
1. Different sized balls

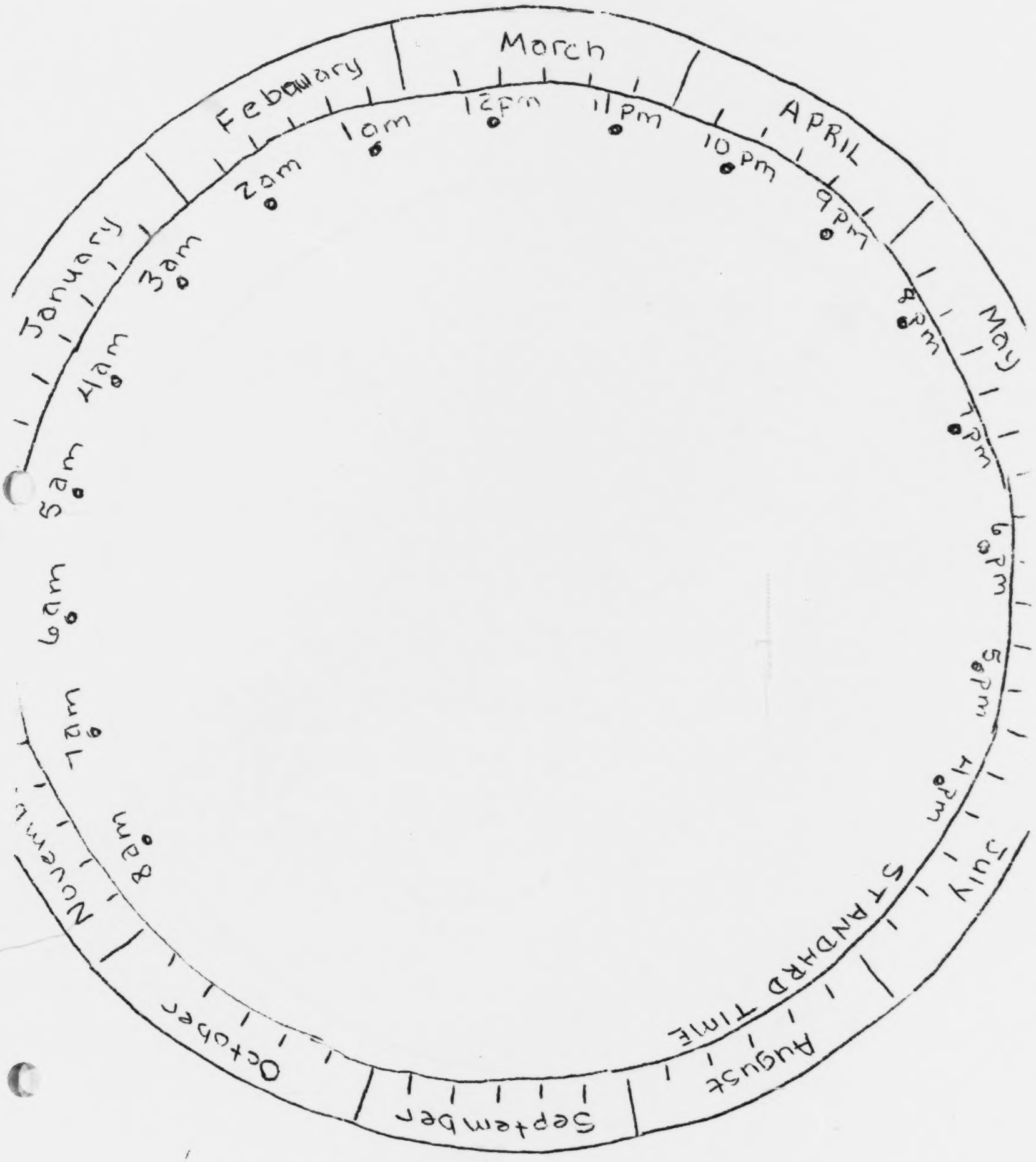
2. Different sized balloons

3. Different sized paper mache'

4. Drawings

Don't forget to include the asteroids!




January
February
March
APRIL
May
JUNE
JULY
AUGUST
September
October
November
DECEMBER
STANDARD TIME
1am
2am
3am
4am
5am
6am
7am
8am
9am
10am
11am
12pm
1pm
2pm
3pm
4pm
5pm
6pm
7pm
8pm
9pm
10pm
11pm
12pm

E. Construct a Sundial

Children can build a sundial out of a folded sheet of paper (the stiffer, the better). The teacher may make a ditto-duplicator master with the appropriate design to provide all children with marked sheets. Here are the steps in designing a sundial of your own, appropriate for latitudes approximately equaling that of Washington, D. C.:

1. Mark the line ABC across the middle of the sheet. The distance BC equals 5 inches and the section from A to B is cut open.

2. The d stances EC and CD are 4 inches each, and F and G are the middle points of BE and BD (they are each 2-½ inches from the edge of the sheet). The triangles CFE and CGD are cut out.

3. The hour lines make the following angles with BD

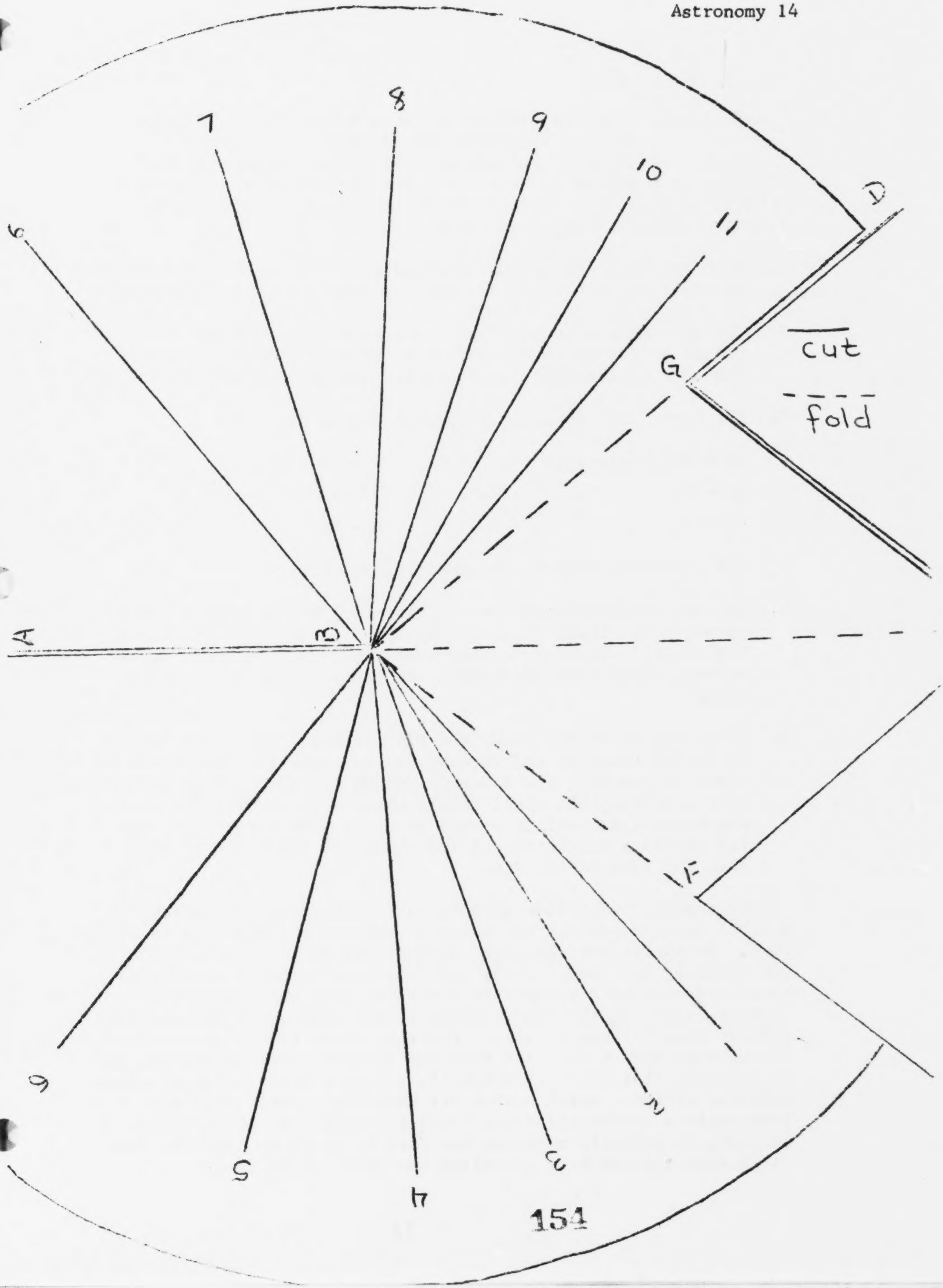
11 - 9-½ degrees	8 - 47 degrees
10 - 20	7 - 67
9 - 32	6 - 90

The afternoon angles are symmetrically located.

4. The two circular arcs are not essential but provide a neater appearance. Their center is at B and their radii (equal on both sides) should be as large as can be accommodated on the sheet. After they are drawn, the paper should be cut along them.

5. After all lines are drawn and all cuts made, the sheet should be folded along BC and then again (in opposite directions) along BF and BG. The sides CF and CG are then joined by tape or with a staple, the final result being a triangular fin rising above the flat surface of the sundial. For actual use, the fin should point north and the shadow of its top edge will mark the time of the day.

This sundial keeps time equally well summer and winter--but several corrections may be needed to convert its readings to actual time. In summertime, daylight saving time is in effect, shifting the scale by one hour. Also, our "standard" time is artificially equalized over wide areas--the so-called time zones--whereas "sundial time" varies continuously across such zones and usually differs from "standard" time. Finally, there exists an irregular discrepancy due to the fact that the earth's orbit around the sun is slightly flattened (elliptical), the true shape being an almost circular ellipse, which causes its velocity to vary over the year. Thus while a mechanical clock keeps a constant interval from noon to noon, in sundials noontime may vary by up to 15 minutes. The correction applied here is called the equation of time.


7
8
9
10
11
D
6
cut
fold
G
A
B
F
0
5
4
3
2
1

F. Construct a Pinhole Camera to view the Sun. CAUTION--NEVER LOOK DIRECTLY AT THE SUN.

The safest and best non-telescopic way of viewing the sun is a pinhole camera, easily constructed from cardboard boxes.

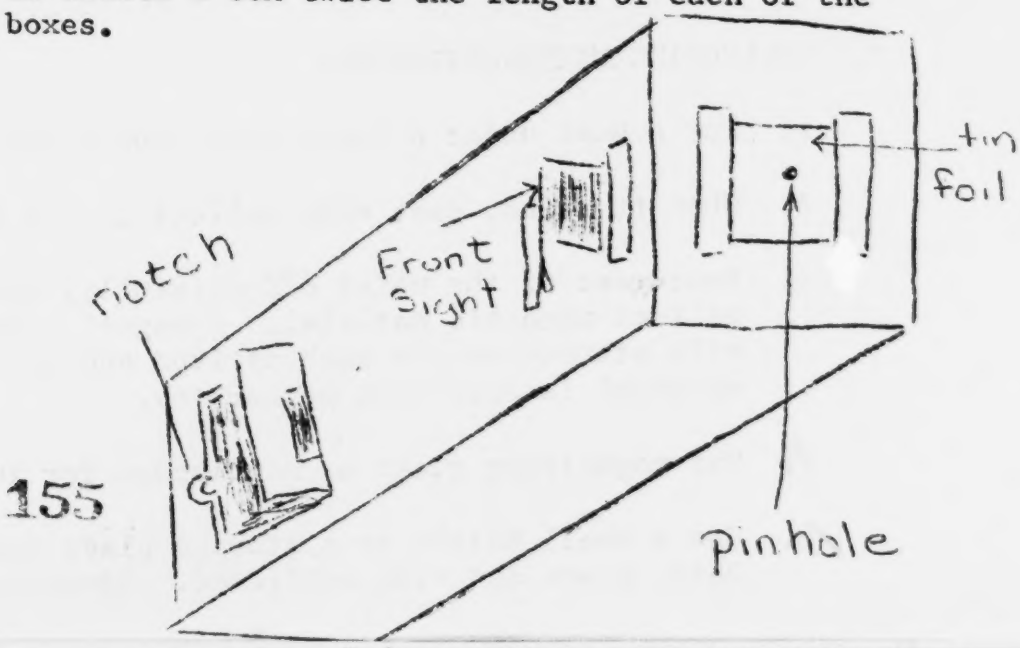
The box used should be at least 3 feet long, or else the image of the sun is uncomfortably small (a 5-foot box creates an image about half an inch across); on the other hand, for ease in pointing it should not be too bulky. Two or more boxes may be pasted together for greater length, in which case any chinks may be covered over with masking tape.

On the top of the box a fairly large hole is cut. Later, when all other parts of the camera are finished, a piece of aluminum kitchen foil is taped over it and a pinhole pierced in it with a large pin or a straightened paperclip. If several holes are punched, each will produce its own image (as will uncovered chinks), but they should be spaced far enough apart so that the images do not overlap.

On one side of the box camera, near its bottom, a flap should be cut to permit viewing of the image (cut a notch as indicated so that a finger can be slipped in and the flap lifted out). The bottom of the box, where the image falls, should be covered with white paper or cardboard for better visibility.

The lifted-out flap also serves as rear sight for aiming the box at the sun. The front sight can be made of cardboard or stiff paper as drawn and should be an inch or two wide: narrow, knife-edge sights (as on a gun) cast a shadow that's too fuzzy to be useful. The camera is known to be aimed at the sun when the shadow of the front sight rests squarely in the middle of the upraised flap.

Note: The main body of the camera is easily constructed out of two empty computer-card boxes. Open the boxes and place them end-to-end next to each other so that the lid of each box fits into the bottom of the other. In this position, tape and/or glue them together to create a box twice the length of each of the two component boxes.



G. Collect information on upcoming meteor showers. Predict possible showers during your stay at camp.

H. Learn to identify the cardinal points using a compass. Mark the cardinal direction points in the classroom and on your playground.

I. Learn to locate and identify constellations and stars visible at your school or home at night. Use telescope, binoculars and naked eye observations.

J. Demonstrate the difference between rotation and revolution. Use the earth-in-space globe.

K. Read to find information and report on the sun, stars and planets to the class.

L. Use the portable planetarium, if available, to set the projected stars exactly as the stars will appear during your stay at camp. Work with a small group of students with the earth-in-space globe if planetarium is not available.

M. Discuss and report on how life is dependent upon the sun. Trace the energy of your body to the sun's energy.

N. Have a resource person come in to talk about some aspect of astronomy.

O. Plan a field trip to the County Planetarium or the Naval Observatory, Washington, D. C.

P. View available filmstrips and films on different areas of astronomy. Check available transparencies also.

Q. Become familiar with the unit used in astronomy to measure distance (lightyear). Have students calculate the distance light travels in one minute; one hour; one year. (The Speed of light is 186,000 miles per second.)

R. Study and report about the affects of the moon's gravitational pull on the earth.

S. COLLECTING MICRO-METEORITES

1. Put a bowl under a drain pipe from a house gutter.

2. When it rains, dust will collect in the bottom of the bowl.

3. Pour mast of the water off carefully, then dip a magnet in to collect magnetic material. A magnet placed near the sediment will attract metals such as iron and nickel. Some of this material is dust from meteorites.

4. Use magnifying glass or microscope for further analysis.

5. Use a small bottle as a storage place for your dust. (Label: Date, place and time collected. Identify meteor shower.)

T. Use a lens to concentrate the sun's rays on a piece of paper to observe the power of the sun's rays.

V. Camp Activities

A. Review with the group before your night observation period;

1. Constellations which may be seen

2. The phase the moon is in

3. The planets that are visible

4. The possibility of viewing "shooting stars"

5. The possibility of seeing a passing satellite

B. Observe the night sky

Get oriented to the sky by locating:

1. Cardinal points of the compass

2. true North-Polaris

3. observer's zenith

4. observer's latitude-use fist sextant

C. Locate and identify major constellations and important stars visible. The night you observe. Examples:

1. Ursa Major--"Big Dipper"

2. Ursa Minor--"Little Dipper", last star in handle is Polaris, the North Star

3. Cassiopea--"W"

4. Bootes--Arcturis

5. Canes Major--Sirius, the brightest star visible in the night sky.

6. Gemini--"twins" Castor and Pollux

7. Orion--Betelguese (a giant red star), Orion Nebula

D. Observe the paths of visible planets. Use the telescope and binoculars for closeup looks at Saturn, Jupiter, Venus, Mars and if possible, the moon.

E. Measure the elevation of various stars including Polaris. Use your "fist sextant".

F. Sketch the stars as they appear at the time of observation. A series of sketches at different times will show the apparent motion of the stars.

G. Photograph the stars at different times during the evening.

H. Read aloud stories of the Greek Myths that go along with the different constellations.

I. Sketch the stars in a particular constellation. Have the children draw what they imagine the pattern to be.

J. Have someone attempt to tell time by viewing the "Big Dipper".

VI. Post-Camp Activities

Those activities (Pre-camp and Camp) that were not completed are designated as Post-Camp Activities. They can be done in the classroom, on the playground or in a field near the school grounds.

VII. Bibliography

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Coward-McCann, Inc.

Moore, Patrick. Telescopes and Observations
The John Day Company

Polgreen, John and Cathleen. The Stars Tonight
Harper and Row

Schneider, Herman and Nina. Science In Our World
D.C. Heath

Ware, Kay and Sutherland, Lucille. Let's Read About Stars
McGraw-Hill

Wyler, Rose and Ames, Gerald. The Golden Book of Astronomy
The Golden Press 1964

Zim, Herbert S. Comets; The Universe
William Morrow and Company

Films (Materials Center)

No.	Title	Time
910	About Time: Measurement Of	*C 59.0M
692	Asteroids, Comets, And Planetoids	11.0M
2319	Big World	C 11.0M
1060	Comets, Meteorites, And Planetoids	16.0M
386	Exploring The Night Sky	10.0M
571	Exploring The Universe	11.0M
2271	Food From The Sea	C 11.0M
1830	Food From The Sun	C 10.0
1914	How We Study The Sun	C 14.0
1706	Instruments Of Astronomy	C 12.0
2318	If You Could See The Earth	C 10.0M
2204	Lightning And Thunder	C 14.0M
2374	Mars And Beyond	C 25.0M
2678	Measuring In Astronomy	C 11.5M
421	Moon And How It Affects Us, The	C 11.0M
655	Mystery Of The Sun Eclipse	26.0M
2541	Night Sky, The	C 25.0M
423	Our Mr. Sun-2 Reels	C 60.0M
1061	Planets, The	C 15.0M
1520	Sky And The Telescope, The	C 15.0M
2300	Space Science: Studying The Stars	C 14.0M
300	Solar System, The	C 11.0M

2294	The Stars At Night	C 11.0M
1754	The Stars	C 12.0
641	Universe	28.0M
2376	We Are Not Alone: Is There Life On Other Planets	30.0M
2383	What Is An Eclipse	C 11.0M
2256	The World Around Us	C 23.0M

*C-Color

Filmstrips (Materials Center)

D-18	"About Our Earth"
4A-2	"Astronomy Group (4 filmstrips)
2H-8	"How We Learn About The Sky"
2H-2	"A Multitude of Suns"
4A-9	"The Sky" (7 filmstrips)
2K-17	"The Solar System"
2H-3	"The Stories of The Constellations"

OUTLINE FOR STALKING AND OBSERVING

I. Purposes . . . . . p. 1

II. Scope and Sequence . . . . . p. 1

III. Background Information . . . . . p. 3

A. Fundamentals of stalking . . . . . p. 3

B. Importance . . . . . p. 3

C. Cautious approach . . . . . p. 3

D. Upright crouching position . . . . . p. 4

E. Cat crawl . . . . . p. 4

F. Flat crawl . . . . . p. 5

IV. Pre-camp Activities . . . . . p. 6

V. Camp Activities . . . . . p. 6

VI. Post-camp Activities . . . . . p. 7

VII. Games . . . . . p. 7

I. Purposes

A. To be able to use the five senses more alertly and efficiently

B. To learn the techniques and skills necessary to study animals in their habitats.

C. To develop an appreciation for world of nature in a more multi-sensory manner.

D. To learn to identify animals by their calls.

E. To learn to identify animals by their tracks.

F. To develop a keener awareness of one's environment.

G. To develop the ability to move unnoticed through the woodland.

II. Scope and Sequence

A. Importance of observation and deduction

1. Develops the alertness and efficiency of the senses

2. Deduction promotes the alertness of the mind through development of reasoning power, imagination, patient research, common sense, and memory.

3. It is a study which has the further benefit of being full of attraction and interest for boys and girls, so that once they have been introduced to it, they continue it with increasing keenness and practice it for themselves.

4. The practical value of such training in supplying a new quality in the character of a boy or girl is incalculable, no matter what vocation they may select.

B. Civilization has a tendency to dull the senses.

1. Vision is often limited by buildings, sight is harmed by artificial light.

2. Hearing is dulled by the continual roar of modern traffic.

3. Smell is clouded by the fumes of automobile exhaust and the smoke from factory chimneys.

4. Taste is lost in the mass of sweets we consume.

5. Touch is the attribute of a few skilled trades and professions only, and is seldom used by the average person.

C. Seeing

1. Out-of-doors your eyes should never rest, but continually glance around in every direction, up and down, right and left, in front and behind.

2. You should be able to see both things that are near and things that are far, both things that are small and things that are large.

D. Hearing

1. Hearing is used in locating, discerning, discriminating, warning, and generally evaluating the environment.

2. Most effective on a calm day when there is little or no "covering noise".

E. Touch

1. Tells of pressure
2. Tells of heat and cold
3. Warns of hunger
4. Tells of weariness
5. Tells of thirst
6. Communicates pain

F. Tasting

1. Used to warn us when food is spoiled
2. Used in identifying certain chemicals
3. Used very cautiously

G. Smelling

1. Useful in identifying both plants and animals
2. Warns us of pollution in air and water
3. Used to warn us when food is spoiled
4. Used as a warning to stay away from certain areas

III. Background Information

A. Fundamentals of stalking - the ability to move from place to place, without being observed, while at the same time observing everything that is going on.

B. Importance - useful in nature study and animal photography.

C. "Cautious approach" - merely consists of walking calmly and quietly in the direction of the supposed quarry.

1. Take advantage of the lay of the land and the plant cover so you will not suddenly expose yourself.

2. Try to adapt your clothing to suit the type of ground over which you expect to move. It is usually advisable to break up the color as much as possible, in order that the outline of the figure will not be so easily recognized at a distance.

3. If carrying anything that shines, be careful to see that the sun does not reflect light from it like a mirror.

4. When moving through woods and undergrowth, do not brush through the small bushes, but lift them aside, slowly and quietly.

5. When pausing to listen - ears are very important - avoid, if possible, halting with the sun shining on any part of you. Get in the shade, as, otherwise, the slightest movement on your part may attract attention.

6. Generally speaking, try to avoid moving with the sun in your eyes, especially when the sun is low on the horizon.

a. It is difficult to see an object in the distance.
b. Colors are difficult to determine since you are looking at the shady side of the quarry.
c. It is easier for the quarry to see you.

7. Avoid swinging the arms. The more movement you make the easier it is for the quarry to see you.

8. Keep your eyes on the move, sweeping far and near, right and left, up and down, looking not at bushes and trees, but through them.

a. The untrained stalker usually looks at a bush, and quite often fails to see what is behind it.
b. Sometimes you can see a much greater distance if you stoop down and look under the bushes.

9. Try to approach the quarry in the direction that the wind will be blowing in from the quarry toward you, so that any sounds you make will not be so readily carried to the ears of the quarry.

   a. This applies also to your scent when you approach mammals other than man.
   b. It is easy to find out the actual direction of the wind by wetting a finger and holding it up to notice which side is coolest.
   c. Remember that the direction of the wind may not remain constant.

10. Do not hurry - most beginners move much too rapidly.

11. If you think you have been seen by the quarry, freeze until the quarry turns its head away, and then move slowly and quietly under cover.

   a. You will certainly arouse suspicion, and probably alarm, if you disappear suddenly.
   b. In freezing, try to assume the general shape of the objects about you.

12. Practice using the cautious approach.

D. "Upright crouching position"

   1. Used when you have located the quarry but are still quite a distance away.

   2. Select a suitable member of the group to demonstrate.

   3. Practice by having the entire group go to a designated place about 50 yards away and stalk toward the instructor, or a selected member of the group. Any member who is seen moving any part of the body must return to the starting point. He may then try again. The emphasis is on proper form, not speed. Point out those who are suing good form.

E. "Cat crawl"

   1. Used when the distance between you and the quarry is lessening, or when cover is getting scarce.

   2. If you ever have the opportunity, watch a domestic cat stalking.

   3. Select a suitable member of the group to demonstrate.

F. "Flat crawl"

1. Used when you are very close to the quarry or cover is very scarce.

2. Select a suitable member of the group to demonstrate.

3. If it is safe to expose the head sufficiently to look around, then it is possible to do this movement rather more on the side - something of a cross between a cat crawl and a flat crawl.

4. Select a member of the group to demonstrate how to move back into cover which you have accidentally moved out of.

5. Select a member of the group to demonstrate the proper method of looking around a tree or other object.

IV. Pre-camp Activities

A. Discussion on how we use our five senses

B. Set up a "smelling center" or a "feeling center" in the classroom that changes daily and contains 4 or 5 items that can be identified by their odors.

C. Have students write riddles, limericks, poems or stories where one or more of the senses is the main topic.

D. Read poems that stimulate the sense of sight or call up imagery.

E. Have some students do research on Indian stalking and observing.

F. Set up a "feeling center". Boxes with a small slit in the top and an object inside that children can put their hand into and try to identify. This would change daily. The object should be something from nature i.e., pine cone, turtle shell, fur, dead insect, stones, bones etc.

V. Camp Activities

A. Learn how to use the five senses more efficiently through stalking and observing.

B. Use the cautious approach, upright crouching position, cat crawl, and flat crawl when stalking.

C. Use stalking on the woodland hike and for birdwatching.

D. Practice stalking and counter-stalking.

1. Practice stalking by having the members of the group scatter in all directions, going far enough away to be out of sight, but then using all methods, stalk the instructor, or preferably, a member of the group carefully selected by the instructor. If a member is seen, so that he can be identified by name, or description, he has to come in and take a seat until the contest is ended. Find out who can stalk the closest without being observed in a given amount of time. At the end of the contest, the instructor should point out any good or bad techniques he noticed.

2. To practice counter-stalking, have one or two carefully selected members stalk the entire group. Those in the group stand until they have located the stalker, or stalkers, then they sit down. They must be careful not to give away the location of the stalker to the rest of the group. The entire group should remain as quiet as they can so that any sound made by the stalker may be heard.

VI. Post-camp Activities

A. Carry on and extend camp activities.

B. Take hikes and try to identify animals by their calls.

C. Use various stalking methods to get wildlife photographs.

D. Use stalking on hikes and camping trips in order to observe animals in their habitats.

VII. Games

A. I SPY--The leader may say I spy a robin. All children who see the robin may squat: the rest remain standing. The leader then points out the robin or asks one of the squatting children to do so. The youngsters continue hiking, in silence, until another object of interest is seen.

B. Observation--Each child is given a list of things to look for on a hike, perhaps with questions. They write down what they see or the answers to the questions and discuss them when they return.

C. Nature Scavenger Hunt--Group is divided into 4 or 5 teams. Each team is given a list of nature objects and a large paper sack. At the given signal, all teams go in search of the items. First team to return with all the items is winner. Sample items: Oak leaf, clover blosson, earth worm, water-rounded stone, maple leaf, caterpillar, cricket etc

D. Hare and Hounds--One player, the Hare, is given a ten minute start on the Hounds, and lays a trail by dropping corn, acorns, colored stones, etc. The hounds attempt to trail and catch the hare.

E. Kim's Game--Place some specimens from nature, acorn, leaf, feather, shell, etc., in a circle on the floor or ground. In the beginning, the youngsters are allowed to observe the items for a longer period of time. As they improve in their power of observation, they aren't permitted to look at the items as long. After looking at the items for the specified time, they are covered up. Each student tells how many items he can remember. You get a point for each item that you remember, leaf, three points for more detail, Oak leaf, and five points for very detailed information, pin oak leaf. The student with the most points wins. Feel free to devise your own point system.

OUTLINE FOR MAPPING AND ORIENTEERING

I. Purposes . . . . . p. 1

II. Background Information . . . . . p. 1

III. Pre-camp Planning . . . . . p. 10

IV. Camp Activities . . . . . p. 10

V. Post-camp Activities . . . . . p. 13

VI. Games . . . . . p. 14

VII. Bibliography . . . . . p. 19

I. Purposes

A. To teach the children how to read a topographic map.

B. To teach the children how to use the compass.

C. To have children realize the value of using a compass accurately.

D. To have children participate in activities that will help them realize the importance of self-reliance in orienting themselves in the woodland area or any surroundings.

II. Background Information

A. Maps

1. What do maps show?

a. Description found in margin

(1) name of the map area
(2) location of the map area
(3) date map was made

b. Details

(1) man-made features
(2) water features hydrographic
(3) vegetation features
(4) elevation features hypsographic

c. Directions

d. Distances

(1) shown as latitude
(2) shown as longitude
(3) drawn to scale as a fraction
(4) as a ruler divided into fractions of miles and miles
(5) as a ruler divided into thousands of feet
(6) as a ruler divided into kilometers and fractions of kilometers

e. Designations

(1) upright type used for places, boundary lines and area names

(2) italics used for hydrographic names

2. Kinds of maps

a. Physical	e. Pictoral
b. Political	f. Road
c. Physical-Political	g. Topographical
d. Globe	h. Aerial
i. Historical	l. Relief
j. Nautical	m. Economic
Celestial	n. Population

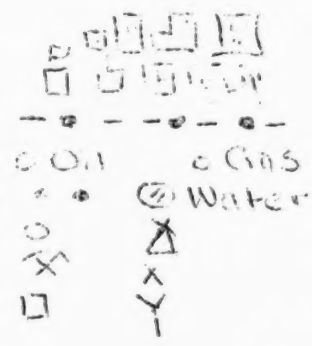
Topographic Map Symbols

Variations will be Found on Older Maps

Improved light duty road . . . . . .
Unimproved dirt road and trail . . . . . .
Dual highway, dividing strip 25 feet or less . . . . . .
Road under construction . . . . . .

Railroad, single track and multiple track . . . . . .
Bridge, road and railroad . . . . . .
Footbridge . . . . . .
Tunnel, road and railroad . . . . . .
Overpass and underpass . . . . . .
Important small masonry or earth dam . . . . . .
Dam with lock . . . . . .
Dam with road . . . . . .
Canal with lock . . . . . .

Buildings (dwelling, place of employment, etc.) . . . . . .
School, church, and cemetery . . . . . .
Power transmission line . . . . . .
Wells other than water (labeled as to type) . . . . . .
Tanks; oil, water, etc. (labeled as to type) . . . . . .
Located or landmark object; windmill . . . . . .
Open pit, mine, or quarry; prospect . . . . . .
Shaft and tunnel entrance . . . . . .



State . . . . . .
County, parish, municipio . . . . . .
Civil township, precinct, town, barrio . . . . . .
Incorporated city, village, town, hamlet . . . . . .
Reservation, national or state . . . . . .
Boundary monument: land grant and other . . . . . .
United States mineral or location monument . . . . . .

Fill . . . . . .
Mine dump . . . . . .
Tailings . . . . . .
Strip mine . . . . . .

Sand area . . . . . .
Cut . . . . . .
Distorted surface . .
Gravel beach . . . .

Perennial streams . . . .
Elevated aqueduct . . . .
Water well and spring . .
Small rapids . . . . . .

Intermittent lake . .
Aqueduct tunnel . . .
Disappearing stream .
Dry lake . . . . . .

Rock, bare or awash; dangerous to navigation . . . . . .

Marsh (swamp) . . . . . .
Scrub . . . . . .(green)

Urban area . . .(red)

B. Compasses

1. Types of compasses

a. Air compass standard

b. Induction dampened

c. Liquid filled

2. Major directions of a compass or without a compass

a. Cardinal points

(1) north
(2) south
(3) east
(4) west

b. Intercardinal points

(1) northeast
(2) southeast
(3) northwest
(4) southwest

c. Other points

(1) north northeast
(2) east northeast
(3) east southeast
(4) south southeast
(5) south southwest
(6) west southwest
(7) west northwest
(8) north northwest

3. Degrees of a compass

a. Total of 360 degrees, complete circle

b. North equals 0 degrees

c. East equals 90 degrees

d. South equals 180 degrees

e. West equals 270 degrees

4. Complications affecting the use of the compass

a. Metal may affect magnetization of compass.

b. There is some variation between magnetic north and geographic north.

(1) the angle may be east or west, plus minus
(2) the angle depends on the observer's position
(3) variation is greatest nearer the poles

c. Winds and ocean currents cause drift, movement to left or right.

5. Use of the compass

a. Sighting with the compass; known as shooting an azimuth, finding a direction in relation to magnetic north

b. Orienting a map, lining up a map with a compass

c. Taking a back azimuth, backsighting

Sample Lesson Plan - No. 1

Purpose: Acquaint children with a magnetic compass.

Materials: Silva Type-5 compasses, one per student.

Time: 40 minutes

Study Period Activity: Teacher may follow up lesson with practical exercises using the compass.

Location: Usually held in area in front of Dining Hall.

Suggestions: Try to cover material thoroughly.

Sample questions and pertinent information:

1. What is a compass? (device for locating position relative to magnetic north)

2. How about THIS compass? (hand held, holding it level, holding it still, holding it away from a large amount of metal) (This compass has three parts - with three arrows: (1) plastic base with the PURPLE arrow or Direction of Travel arrow. (2) Metallic casing with the BLACK ARROW OUTLINE that turns with the casing. (3) RED TIPPED or Magnetic North arrow that swings free and that points to Magnetic North when not distracted by a large amount of metal or a magnet.)
   Metallic dial has the CARDINAL points indicated on the top and the INTER-CARDINAL points indicated on the base in numbers. Can you find 220°? Check. Can you find 240°? Check. Where is 230°? (long line between 220 and 240). Can you find 222°? (first short line past 220) Can you find 224°? (second short line past 220) Can you find 223°? (space between 222 and 224) Long line stand for 10 degrees, short lines stand for 2 degrees or the even numbered degrees, and the spaces stand for the odd numbered degrees.

3. Shooting an azimuth or taking a bearing to a landmark: What is an azimuth or bearing? (direction) What is a landmark? (without pointing, say: "Everybody look at that Pepsi machine." Without pointing, say: "Everybody look at that drinking fountain." Without pointing, say: "Everybody look at that tree." "Which one was NOT a landmark?" (tree) "Why?" (more than one tree) "So what is a landmark?" Something that is easily recognizable and identifiable. "Now (pointing to tree beside boathouse) can everyone see THAT tree?" "Then THAT tree could be a landmark."

Here's how to <u>shoot an azimuth</u>, or find the direction from you to a landmark:

<u>First</u>: stand and face the landmark. Everyone face the drinking fountain.

<u>Second</u>: hold your compass level at waist or chest height (whichever is easier for you to see) with the PURPLE ARROW POINTING AT THE LANDMARK.

Third: lock or grasp the compass tightly in your hand by gripping the sides (like this) so that the purple arrow will continue to point to the landmark.

Fourth: with your other hand, slowly turn the metallic dial so that the RED TIPPED ARROW points to the letter N and is lined up with the BLACK ARROW OUTLINE.

Fifth: read the number at the base of the purple arrow stem.

"Everyone read their number out loud. If you are having trouble reading your number, raise your hand for help." (check everyone - they will have, or should have, different numbers)
"Everyone had a different answer, but I didn't say that you were wrong." "How could everyone have a different answer and still be correct?" (standing in different places and using different compasses) Try another one (repeat, using the clock on the office steps, the tree or trash can beside the boat house and the tree on the tip of land across the river as landmarks) when children move around, have them get a clear shot to the landmark without straying too far from the group) (help those in trouble - most of the trouble will be reading the 360° reading instead of the number at the base of the purple arrow - if a child varies more than 20°, check him for extra help)

4. <u>Orienting yourself</u>: "Now that you can shoot an azimuth to a landmark, see if you can orient yourself. If we came out here tomorrow morning and wanted to take a picture of the sunrise, which way would we have to point the camera? Everybody point. Don't rely on your neighbor." (without indicating the correct direction, ask everyone to remember where he pointed, set his compass so that 360° is at the base of the purple arrow stem, and holding the compass level in front of him with the purple arrow pointing away from him, slowly turn until the red tipped arrow is lined up with the black arrow outline and the purple arrow - he will now be facing in the direction of magnetic north) "Raise your right arm and point. Where are you pointing?" (east)

"Where does the sun rise?" (east) "Did you point that way before?" "Raise your left arm - which direction is this?" (west) Your back is facing what direction? (south) You are now oriented.

5. Following an azimuth: Sometimes you will want to follow a predetermined direction that you set on your compass. Here is how you do this:

   (1) Set the azimuth on your compass by placing the figure at the base of the purple arrow stem. Set 90° on your compass.
   (2) Hold the compass level in front of you, with the purple arrow pointing AWAY from your body.
   (3) Slowly turn your whole body, including your feet, until the red arrow points to the letter N and is lined up within the black arrow outline.
   (4) Sight over the tip of your purple arrow at a landmark in the distance (everyone will have a different landmark - make sure no one is standing in front of another person).
   (5) Keep your eyes on your landmark. Don't look at your compass. Don't look at your feet.
   (6) Take ten steps in that direction. (start with 10, work up gradually in distance - check people looking at their compass or their feet - children making errors in this exercise will be easy to detect: they will be going across the path of another child - mostly they will be following the North arrow, not the purple arrow) When you have taken the correct number of steps, stop and look around at your classmates. Are they standing roughly the same in relation to you before you started? They should be! (conduct as many drills as time allows - varying the settings by approximately 120° and increasing the distance)

6. Shooting a back azimuth: To check if you have walked a straight line, when you get to where you are going - step - turn and face your starting point - point the purple arrow to your starting point. If you have walked a straight line, the red arrow will swing around and point to the letter S. If not, it will point to the side of the letter S. (you can pair up the children for this drill - have one child walk and the other stand where he started as a marker - child standing can shoot an azimuth to the walking child - he should get the same reading as the one you gave to the walking child to follow)

Outcome: The magnetic compass is a useful tool to have, providing you know how to use it. You have to take your time when you are using it and be patient. You need to be accurate, you can't rush through the settings. Most important, you have to have confidence in yourself!

Sample Lesson Plan - No. 2

Purpose: To acquaint children with a topographical map

Materials: Geological survey maps "South River Quadrangle" or another map (one per 4-5 children)
Teacher may use "South River Quadrangle" to reinforce map symbols, directions, orienting a map, colors, etc.

Suggestions: Try to plan allotted time in order to cover all the material. Indirect teaching is most effective in this area.

A Suggested Procedure For Map Study Is As Follows:

1. What is a map? (a picture of the ground)
   Look at the map. What do you see? List these things. (work by groups, allow 3-5 minutes) Read your lists. Discuss the colors. (blue: water, green: forest, black/red/pink: man-made objects, brown: land, blue-green: swamp)

2. Look at Annapolis, how many LANDMARK buildings can you find? (many, most labeled)

3. Find the John Hanson Highway. What can you tell about this road? (dual lane, man-made, Route 50, runs east and west, has bridges, etc.)

4. What road did you take to camp? (Central Avenue) Find it. Trace your route to camp on this map. What kind of road was Central Avenue? (blacktop) See where you turned off Central Avenue? What kind of road was this? (dirt)

5. Can you find Camp Letts? As you see, it is on a peninsula. Can you find the building you are in right now? (largest black aquare) Can you find the boathouse? What are the black lines sticking out into the water? (docks) Look out of the window at the boathouse. What kind of land is between the Dining Hall and the boathouse? (level, cleared) Look on your map, what color is between the Dining Hall and the boathouse? (white) Look out of this window. (pointing) What do you see there? (trees) Look on your map for the boys' cabins. What color is around them? (green)

6. Can you find your cabin on the map?

7. Can you find the new lavatories? Why not? (built after map was made)

8. When was this map made? ( ) How can you tell? (lower right-hand corner)

9. Find a Bench Mark (BM) on the map. What color is it. (black) What does this tell? (man-made) (A BENCH MARK is a brass disk put into the ground, usually in concrete, to help surveyors, road builders, and home builders determine how high the ground is at a particular point.)

10. Look on top of this hill (any hill with a brown X). How high is it? (number by the brown X tells height)

11. Look at this hill (any hill without a brown X). How high is it? (determine by reading the elevation of the highest contour line) How many feet between contour lines? (20, as indicated at bottom center of map) (show children that this is vertical height, not horizontal measurement - 20 feet is slightly less than the height of the ridge pole in the Dining Hall)

12. Look here (upper left hand section of map, South River, near word SOUTH). How high is the ground at this point? (count contour lines) Is it flat or steep? (steep because lines are close together)

13. Look here (lower right hand section of map, South River). What do the blue numbers and lines indicate (depth of water)? High tide or low tide? (Dantum is means low water - bottom center of map) Can you find the word PILE? What is it? (tall straight tree driven into the river bottom, usually used to tie boats) How can you tell it was put there by man? (black)

14. Look here (top center of map, water areas) at these bodies of water. What the black lines? (dams - not bridges because of lack of roads) Any clues? (pumping station) Look here (top right center at edge of map) at these black lines with small dots going into the outskirts of Annapolis - what is it? (power line) (small dots are poles)

15. Can you find a railroad? (Annapolis) Single or double track (one line is single, two lines are double)

16. Look at Edgewood. Do you think the area would look the same if it were mapped today? (no) How would it be different? (more houses, less trees)

17. Demonstrate how to ORIENT A MAP. (pre-set compasses with the 360° mark coinciding with the base of the purple arrow stem - located on the plastic portion of the compass. Place plastic edge along MN arrow in the declination diagram - lower left hand portion of the map.

Turn entire map slowly until red tipped arrow points to letter N on metallic dial and coincides with black arrow outline inside of metallic dial. Map will now be oriented - i.e. laying on the ground the way the ground lays.)
Have all children orient their maps. Check.
Value of orienting your map is that you can find where you are, and the names of the land features around you. For instance, what is the name of THAT (pointing) island? Check the map. (it will be in the same relative direction from your location - Dining Hall - on the map as you pointed on the ground) (Do this several times - for the different wharfs and islands that you can see from the Dining Hall)

18. Where is this map located in Maryland (bottom right on the margin)?

19. What is the Declination Diagram (lower left in the margin - looks like celery)?
Because of the location of the Magnetic North Pole - 1,400 miles south of the real North Pole - magnetic compasses such as this one don't always point to the real North Pole. In the diagram, the line with the star stands for the real North Pole or True North. (could include a discussion of Polaris if time permits.) The line with MN above it stands for Magnetic North. GN stands for Grid North, which is a Map Makers north. The Declination in this area - or the difference between a magnetic compass reading and true north - was $7\frac{1}{2}^{o}$ at the time this map was made. It will change from year to year.

20. If there is any time left, play "Map Detective".

21. Summarize the lesson: What is a map? (Maps are like books - they can tell you something if you can read them.)

III. Pre-camp Planning

A. Planning

The children should have been exposed to the fourth grade "Maps and Globes" unit; be able to differentiate and understand the significance of colors; read and comprehend map terminology and various geographic terms.

The teacher may wish to obtain:

1. Be an Expert With Map and Compass (may be purchased at any Scout Service Stores such as Lansburgh's, Woodward and Lothrop, etc.)

2. Pamphlet "Topographic Maps" a single sheet "Topographic Map Symbols" both published by the Geological Survey Map Information Office, Washington, D. C. 20242.

3. "Compass Game" put out by Boy Scouts of America (25¢ at any Scout Service Store)

The teacher should list materials needed for the various activities. The participant school and teacher are responsible for supplying and bringing the specified materials and equipment for the selected activities.

Vocabulary Words

azimuth
bearing
back bearing
direction
declination
topographic maps
contour lines
contour interval
landmark
longitude
latitude
resection
pace

Explain and Emphasize: Cardinal Points of a compass: North, South East, and West; Intercardinal Points: all points in between; Hydrographic Features: water features; Hypsographic Features: land features.

B. Pre-camp Activities

1. Teacher and class could go over compass directions, beginning with the cardinal points and proceding to the intercardinal points, and finally to the other points.

2. Students could cut out large paper circles and fold them into sixteenths to represent the compass points, marking them accordingly with the starting letters of these points.

3. The teacher may wish to teach the class the degrees of a circle, and relate these to the points of the compass.

4. Give children an opportunity to pace, or double-step distance which will be needed for later camp activities.

   Procedure: Lay off a known distance along a straight line (the edge of the blacktop would do). Have the children walk along this line taking normal steps and counting each time the left, or right foot hits the ground. Divide the known distance by the number of double-steps, and this is the child's pace. After the students have established their pace, they could pace off a distance of 25, 35, or 40 feet, and then measure the distance to see how accurate their pacing is.

IV. Camp Activities

A. The children are instructed in how to use and read a topographical map. (Refer to sample lesson plan)

B. The children are given compasses to use, and are taught how to read the directions and degrees. (Refer to sample lesson plan for activity B, C, D, and E.)

C. The instructor demonstrates the use of the compass for shooting an azimuth, and the children are given opportunities to practice doing this themselves.

D. The instructor demonstrates how to orient a map with a compass. The children are given opportunities to practice taking an azimuth, following an azimuth, and taking a back azimuth. With the guidance of the instructor.

E. The class runs through a compass course which consists of a line of 20 stakes on an east-west line, each 5 feet apart. Every child gets a card containing a set of three directions, each set consisting of a compass reading and a specified number of feet. Each participant begins at the numbered stake designated on his card. The object of the game is to follow the card readings, which form a triangle out from the row of stakes, and eventually end up at a new numbered stake corresponding to the answer on the instructor's answer sheet.

F. Those students who finish the course early, or who show an aptitude for compass work, are given a resectioning problem to do, involving a map of the area which they must orient, find a landmark, shoot an azimuth, take a back azimuth, draw the back azimuth on the map, do the same with another landmark, and find their present location on the map where the two lines cross.

G. If time permits, children may play "Map Detective" or "Compass Running" using canoes or integrating shoreline ecology, woodland community, etc.

V. Post-camp Activities

A. The class could draw a map of their school grounds to scale, showing high and low spots by the use of contour lines. They could take temperature readings of the air and soil in places where particular native plants grow. Examinations of the soil at these spots may indicate how plant life is tied in with soil and temperature.

B. Using the same map as mentioned in number one, the students could choose a position, sight two objects easily identified and locate their position on the map using the resectioning method explained in camp activities.

C. The teacher and a group of students might wish to set up a compass course on the blacktop. Similar to the one used at camp.

D. Students could make a collection of different kinds of maps, or maps with different projections, and could make a bulletin board display of them.

E. The teacher and/or a group of students could lay out 5 courses similar to the camp compass course, but all having a common final stake. Put a treasure at this point and call it a treasure hunt.

F. The class could pretend that the office or school is the center of the compass. All directions, to multi-purpose room, home, store, etc. are given by compass direction.

G. Individual students who so desire may want to make their own compass by one of two methods:

Method 1

Materials - watch, string, stick, sunshine
Procedure - put the watch on the ground, stick the stick into the ground so that the shadow falls along the hour hand of the watch. Put the string across the face of the watch so that it falls half-way between the hour hand and twelve o'clock. The number that it crosses is due south. Where the string hits the numbers on the opposite side of the watch dial is due north.

Method 2

Materials - needle, magnet, cooking grease, non-metal container, water

Procedure - Stroke the needle with the magnet, rubbing from the eye to the point. Put a very small amount of cooking grease on the needle. Carefully place the needle in a little bit of water, just enough to float it. The eye of the needle will point north.

H. Give groups of children the opportunity to play the various games such as The Compass Game 1 and 2; "Map Detectives"; and others.

VI. Games

A. Compass Game 1 - On the ground draw three, or more, large circles with sixteen compass points indicated on the perimeters of the circles. "It" stands in the middle. Two other persons stand on the outside of the circle. "It" calls out two compass directions. The other two persons try to stand on these two marks before "It" can reach one of them. The person who is left is the new "It".

B. Compass Game 2 - Draw large circles, one for each team. Place objects or numbers on folded tagboard on the perimeter of each circle. Be sure that you have the same object on the same place in each circle, i.e. apple at 90 degrees, number six at 120 degrees, etc. At the signal the first person in the relay line of each team runs to the center of the circle with a compass and takes a reading on an item or a number. He announces the reading to an umpire who records it. He then runs back to tag number two person who repeats the operation for another item, and so on until the team has finished. The time is then recorded and the accuracy of the readings are checked. The winner is the team with the fastest time, or the greatest accuracy, or both.

C. Compass Relay - Select team members and station them at certain points along the course, with their locations unknown by the other team members. The first runner has the reading for entire team. He takes the first reading which will take him to the second runner, who takes the next reading and runs to the third team member, etc. The first team finished wins. A maximum time limit should be set.

D. Compass Treasure Hunt - Individuals are given a list of readings, of similar difficulties and distances, which go different ways, but all end up at the same place. At this place there is a prize hidden for the first one who gets there.

E. Map Detectives - Teams of two players are given a topographical map and grid and azimuth readings, with instructions or questions to locate what is at that point. First team to find the designated point or answers the questions wins. (Sample Questions for Map Detectives - prepared and compiled by a local school)

1.	What is the title of this map?	Washington East Quad.
2.	What is the title of the map to the east of this map?	Lanham Quadrangle
3.	What is the date of this map?	1965
4.	What is the scale of this map?	1:24,000
5.	What is the declination of this map as of 1965?	7½ degrees
6.	What is the state route number given to Riverdale Road?	412
7.	What is the name of the river in the southwest corner of the map?	Anacostia River
8.	What is the name of the bridge that crosses the above river at its southernmost point?	Sousa Bridge
9.	Who edits and publishes this map?	Geological Survey
10.	What major, double lane, heavy duty road runs northeast, beginning at N. Y. Avenue?	Baltimore Wash. Pkwy.
11.	What does this symbol stand for along the Northeast Anacostia river?	Gauging station
12.	At the University of Maryland, what is the elevation of the Bench Mark?	167 feet
13.	On what road is Northwestern High School?	Adelphi Road
14.	What does this symbol stand for east and west along the Amacostia River?	marshlands
15.	How many miles is College Park Airport from your school?	approximately 3 miles
16.	What is the closest heavy duty road to your school?	Ager Road
17.	The D. C. Stadium in the southwest corner of your map is west of what bridge?	East Capitol Street Bridge
18.	What is located between Ager Road and Riggs Road with symbols like these?	WRC Radio Towers
19.	In the southeast corner of your map, what do these symbols stand for?	Water tanks
20.	What is the highest elevation noted in the golf course area in the northwest section of this map?	200 feet

21.	What hospital is located on Queensbury Road in West Riverdale?	Leland Memorial
22.	What is the elevation of the Bench Mark near the intersection of Bladensburg Road and Kenilworth Avenue.	45 feet
23.	What is the elevation of your school?	50 feet
24.	How far is University Hills Rec. Center from your school? In feet? In miles?	8,000 feet or approx. 1½ miles
25.	What is the name of the library east of your school located on Adelphi Road?	Memorial Library

F. Compass Running by John Kautz Instructor, April, 1968 p. 36

An activity that can be integrated with the presentation of certain academic areas, while also serving as a conditioner for the AAMPER 600-yard walk/run test is cross-country compass running. Not too large an area is needed, but the greater the space available, the greater the potential variations in setting up a course. The ingenuity of the instructor is also an important factor.

MECHANICS OF THE ACTIVITY: The idea is the same as in cross-country running; that is, the runner or runners attempt to complete a prescribed course in a mimimum time. Though the course is prescribed, the exact route has to be determined by use of a compass. The course is outlined with specified stations at varied distances, each station being at a compass reading which differs from the others.

Each runner or group of runners is given a compass and an information sheet which includes this data: the compass reading to be followed, the exact distance to be traveled, and the type of identification marker to be brought back from each of the circuit stations. With this information provided, and upon receiving permission to start, the runner or team leader must compute the distance involved in terms of the number of running or walking strides it will take for him to traverse each segment or leg of the course. With this knowledge the individual or team begins to run/walk the course, picking up station markers and returning in the least time possible.

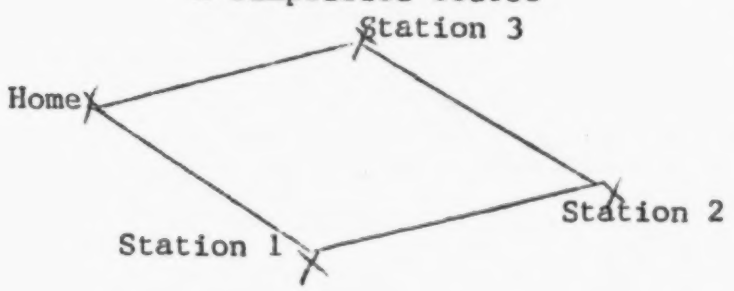
PLANNING SUGGESTIONS: Students will have to be taught to read a compass. The deviation factor will heve to be explained and the possibility of additional interference by man-made structures. The course should be laid out to avoid such confrontations, if possible. After determining his point on the compass, the child should select a fixed landmark ahead on this course in order to proceed without having to recheck his compass reading too frequently.

Another important phase of this activity is for the runner to know his normal walking and running stride so this can be figured into the various distances given. Preseason practice in measuring specified distances of 10, 15, or 30 yards and then letting the child experiment with his stride will certainly aid in this comprehension. "Dry runs" can be conducted wherein the child can be tested over short distances as to his accuracy in determining when to stop. If there is variation in local topography, the instructor should make his students aware that the stride will be somewhat altered when "puffing" uphill or "applying the brakes" on a downward incline. Rehearsals may have to be run here also.

It is almost needless to mention that if such running is to take place during a class period, the course will need to be limited in length, whereas after-school competition can be expanded.

The age of the children must be kept in mind. It is easy to inadvertently draw up a course exceeding a reasonable distance. The initial course especially should be short and uncomplicated.

A Simplified Course



DATA:

1. Follow a 164-degree course for 250'.
2. At Station 1 pick up the card which gives the course you would have to travel if ordered to return home. Continue now for 100' on course 80 degrees. (A number of cards have to be available.)
3. At Station 2 choose the card listing your state bird and flower. Proceed on course 357 degrees for a distance of 300'.
4. At Station 3 make a sketch of what you observe (could be some definite object) when sighting on a reading of 25 degrees. Return home on course 263 degrees after traveling 200'.

As experience and endurance are built up, the features of distance and clues found at the stations can be made more challenging, e.g., the use of the metric system can be explored.

ADDITIONAL SUGGESTIONS: In the beginning, it is probably wise to have the children compete as a team so they can help one another. Such help would be in the form of computing and checking strides, reading the compass, and solving problems posed at the various stations. It is possible to have two teams running simultaneously on one course, by having them go in opposite directions from Home Station. A greater number of teams can be running at the same time if additional courses have been worked out in advance.

There is great potential in this physical fitness activity in that other areas of learning can be incorporated into the overall picture. In arithmetic, the practice given in the use of computational procedures is one of the most valuable learning aids that can be provided. In the science field, the value of understanding compass readings and how the compass itself works is obvious. The function of magnets can be brought into focus as well as knowledge of common trees, leaves, flowers, and rocks, in the local community. The making and studying of maps can be an associated project.

As previously mentioned, only the degree of a teacher's ingenuity will dictate how extensive and exciting this activity can become.

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OUTLINE FOR NATURE CRAFTS

I. Purposes . . . . . p. 1

II. Suggested Crafts . . . . . p. 1

III. Pre-camp Activities . . . . . p. 10

IV. Camp Activities . . . . . p. 11

V. Post-camp Activities . . . . . p. 11

VI. Bibliography . . . . . p. 11

I. Purposes

A. To develop an awareness of the beauty of nature's resource materials and their use as art forms.

B. To provide creative manipulative experiences using natural materials.

C. Develop an understanding of conservation principles.

II. Suggested Crafts

A. Woodland Collage

Materials: cardboard, white glue, natural materials that are dead- acorns, pine needles, seeds, bark, sand, pebbles, etc.

Procedure: a. Discussion of "What is a Collage?" (Artistic composition of fragments of printed matter and other materials pasted on a picture surface.)

b. Go out and gather natural materials

c. Get a piece of cardboard and put name on the back

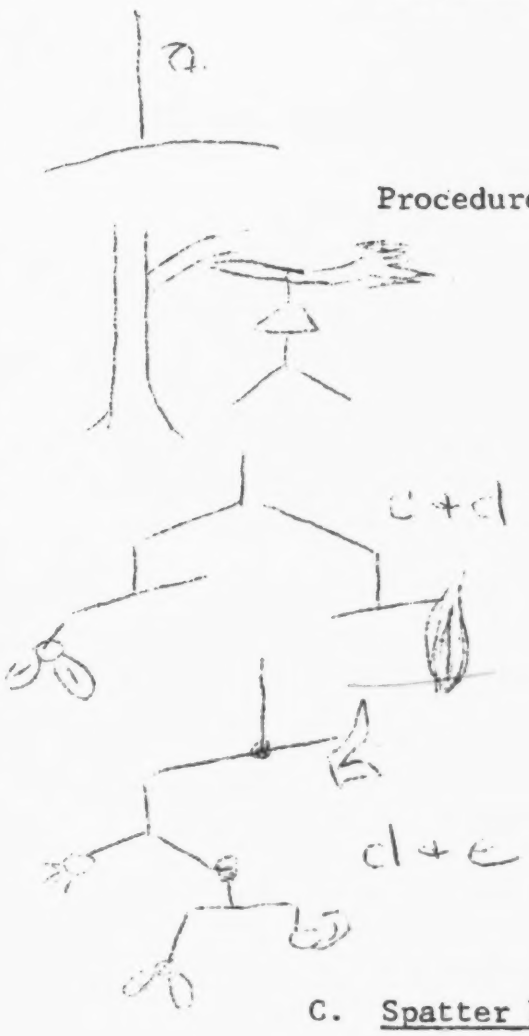
d. Experiment with natural materials in different positions until you come up with a design that you really like.

e. Put a small amount of glue on each item or on the cardboard

f. Replace the item in its previous position. (repeat this process until every item is glued to the cardboard)

g. Clean up and evaluate

B. Woodland Mobile



Materials: Collect pieces of wood or driftwood, sturdy twig for top of mobile, wire, coat hanger, string, seeds (sweet gumballs, acorns - others), pebbles, feathers, glue (white), hand drill to make holes in acorns or pieces of wood.

Procedure:

a. Start with a sturdy twig from a tree or you may use a stiff piece of wire or a wooden dowel.

b. Tie the first piece on a coat hanger with some string. Hook the hanger over a limb of a tree (if it is a calm day) or at a doorway, so that your mobile will hang free.

c. Tie on a piece of wood - then add others. The balance will change as you add items. (This will take some manipulating to bring it in balance again.)

d. Try adding some of the objects as acorns or seeds. Balance is important, but the appearance of the mobile is just as important. (Too little is better than too much!)

e. Experiment with different combinations to balance your mobile.

C. Spatter Painting

Materials: cardboard, colored construction paper, wire screens 6 inches by 6 inches, toothbrushes, powder paints, bowls, leaves white oak, black oak, tulip poplar, sweet gum, and ash, straight pins, pencils, newspapers

Procedure:

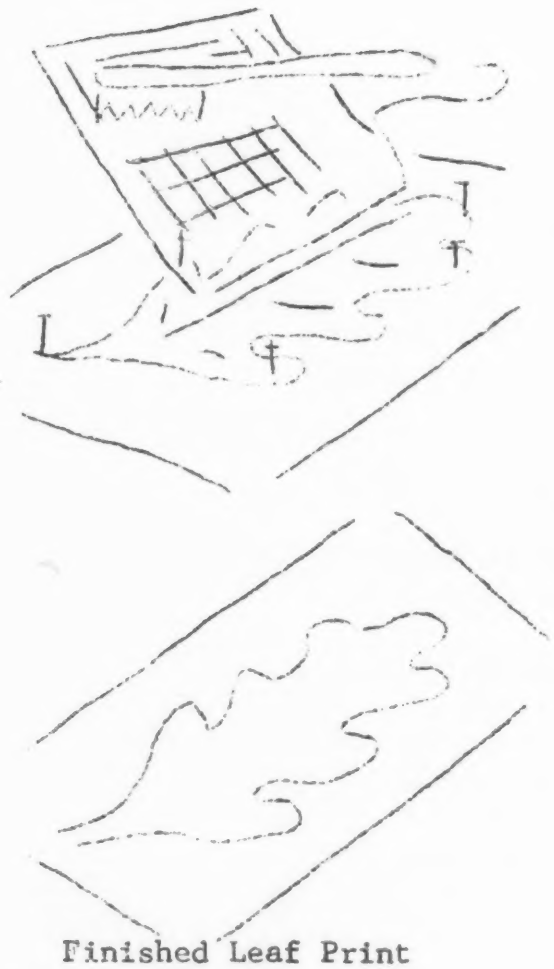
a. Gather the leaves that you want to have spattered (It is preferable to have the leaves previously pressed in between some newspapers.)

b. Cover working area with several layers of newspapers; choose the construction paper and paint that you wish to use.

Cardboard serves as backing

c. In the lower right hand corner, write your name.

Pin leaf on Construction paper



Finished Leaf Print

d. Using straight pins, pin the leaf onto the construction paper which is on a piece of cardboard. (The cardboard serves as a backing in which to stick the pins.)

e. Put pins at points and depressions so that the leaf lies very flat against the construction paper. (Slant pins toward the center of the leaf so that they will not retard spraying.)

f. Holding your screen in one hand, use your other hand to dip your toothbrush in the paint. (Shake off excess.) If paint quickly and thickly fills the squares of the screen, there is too much on the brush. Scrub toothbrush back and forth over the screen until all the paint is gone. Repeat this procedure until there is a sufficient amount of paint on the paper.

g. Carefully remove the pins and leaf.

h. Place your print somewhere to dry.

i. Clean up and evaluate.

D. <u>Sandcasting</u>

a. Indoors

Materials: Plaster of Paris, damp sand, box, mixing bowls, things from nature: shells, gumballs, twigs, cork, etc., scraper, like a ruler, water, paper clips

Procedure:

a. Put sand in a box of sufficient size to hold the objects to be cast and still leave a border on the sides.

b. Dampen sand so grains will stick together.

c. Children should bring in some things from nature

d. On the floor next to your box of sand, EXPERIMENT by placing your materials in different positions until you come up with a position that you really like.

e. Take your objects one by one and press them firmly into the sand in the box.

f. Use equal amounts of water and plaster of Paris - first placing water in a bowl and mixing the plaster in slowly so that the air bubbles will come to the top. Stir until it starts to thicken. When you have thick "gravy", pour plaster into design.

g. If you are making plaques, a twisted wire in the back will make a wall hanger.

h. After it has started to harden a little, write your initials in the sand cast.

i. Remove sand cast when hardened, usually in about 15 minutes. Remember: the wetter the sand the longer it takes for the plaster to dry. Use your own judgment. Some sand will stick to plaster, it may be left for texture or removed with a brush and water.

b. Outdoors

(1) On The Waterfront

Materials: Plaster of Paris, damp sand, mixing bowls, things from nature, scrapers, water

Procedure: a. Locate a spot on the beach where the sand is damp. (Put your materials here.)

b. Gather things from nature which you would like to incorporate into a design or picture.

c. Scrape a clear, flat place about six inches square. This is your "practice" mold.

d. EXPERIMENT with the things you have collected. Put them in different positions until you have a design you really like.

e. Right next to your practice mold scrape another clear spot <u>six inches square</u> but also <u>one inch deep</u>. This is your real mold. Take each item from your practice mold and place it in the same position in the real mold. Press them firmly into the sand.

f. Now follow the previous procedure beginning with the mixing of the plaster of Paris.

(2) In The Woodland

Materials: Plaster of Paris, mixing bowl, spoon or stick, narrow strips of cardboard, paper clips, (tempera) paint, paint brush, water

Procedure: (Easiest animal tracks to cast are those in mud or clay; most difficult, in snow or dry sand.)

a. Find a good foot print.

b. Brush it clear of leaves and twigs.

c. Sprinkle lightly with talcum powder.

d. Using a cardboard strip, put collar around track, joining ends with paper clip. (Enclosure may be square, round, or different shape.)

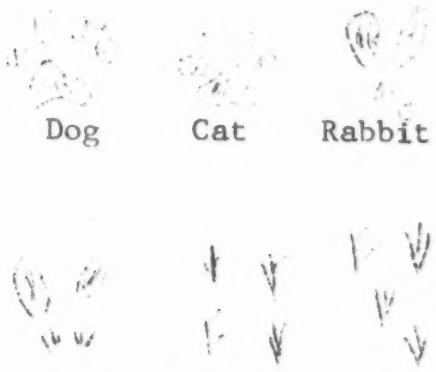
e. Add plaster to water, until consistency of creamy- pancake batter. Tap bowl to get rid of air bubbles in the plaster.

f. Pour plaster around collar and then into track. (If plaque, bend paper clip to form wall hanger and place in plaster.)

g. When cast is hard (30 minutes) peel color off and lift it carefully.

h. Allow to dry thoroughly, then wash off dirt. It can be painted or left as is.

Common Animal Tracks



(This negative cast can be used to make a positive cast by <u>covering the surface with grease</u> (lard, vaseline) and follow same procedure or the one given for sandcasting indoors.)

E. <u>Screen Printing</u>

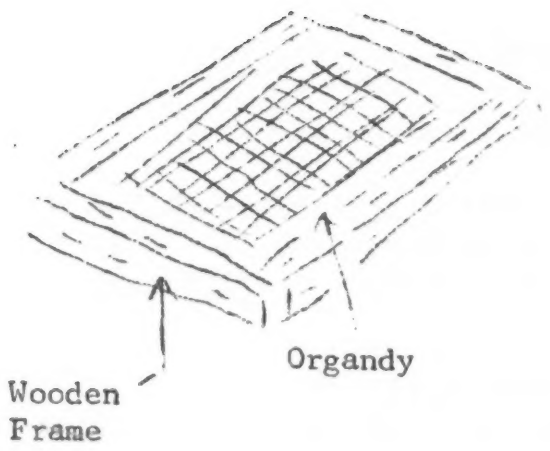
Materials: a. Screen - nails or corrugated fasteners, strips of wood, stapler, organdy material, hammer

b. Print - art paper (light shades), finger paint, kitchen spatula, old magazines size of frame

Procedures: a. Screen Frame

Use strips of wood (approx. 14" x 20") to make rectangular frame. Staple or tack organdy to frame, keeping organdy stretched tight.

b. Print



(1) Select a leaf (fern make interesting prints)

(2) Place art paper on top of magazine

(3) Place leaf on art paper

(4) Carefully place frame <u>organdy side down</u> on the leaf.

(5) Put one tablespoon (approx.) of finger paint into the frame at a time and use spatula to spread it across the screen.

(6) Use spatula to spread finger paint evenly from edge to edge until screen is entirely covered.

(7) Lift off frame and peel off art paper; set print aside to dry. (If frame and print are handled with care, (leaf) will stick to organdy and may be used for additional prints.)

(8) Start with lighter shades of finger paint if colors are going to be mixed for additional prints.

(9) When finished, clean screen thoroughly with water.

F. <u>Crayon Rubbing</u>

Material: crayons without paper around them, white ditto paper, newspapers, leaves, white oak, black oak, tulip poplar, sweet gum, ash, rulers.

Procedures: a. Discuss the characteristics of the five local trees.

b. Go out and gather your leaves.

c. Place some newspapers on the spot where you will be working.

d. Flatten leaves by placing them in between newspapers.

e. Write your name or initials on the white paper in one corner.

f. Now take one of your leaves and lay it vein side up on the newspaper.

g. Place a sheet of white paper over the leaf.

h. Using the color of your choice, rub the crayon on the paper <u>from the center out</u>. Always go back to the center of the leaf and rub out. Do this until you can see the complete image of the leaf on the paper. Remember: always keep one hand on the paper to keep it stationary; other wise, if you move your paper, you will get a double image of the leaf.

i. After finishing the crayon rubbing, write the name of the leaf on the paper.

j. Clean up and evaluate.

G. <u>Tissue Craft</u>

Material: colored tagboard sheets, Sakuragami paper or single piece of tissue paper, brushes, rulers, pencils, bowls, Elmer's glue, white glue, water, living things from nature that are flat: grass, ferns, buttercups, leaves, wax paper, scissors, paper cutter.

Procedures:

a. Gather some of the suggested items from nature.

b. Place materials on a piece of household wax paper, REMEMBER - the flatter they are, the better they are. EXPERIMENT by placing these specimens in different positions until you come up with a design that you really like.

c. Cover entire design with a single piece of rice paper or sakuragami paper.

d. Using a brush and always working from the center out; saturate the paper evenly with a soft tapping motion in applying a diluted solution of white glue, 2 parts water to 1 part white glue.

e. Let the tissue and wax paper dry thoroughly.

f. Trim the edges using scissors or a paper cutter. On a small sheet of paper, write your name and the name of your school. (Place this on your tissue design.)

g. Clean up and evaluate.

H. Trail Signs (refer to Woodland Community - Nature Trail Signs)

I. Sand table

J. Sand Painting - obtain fine, preferably white, clean sand through a collecting trip. To dye the sand, use regular, all-purpose dye, food coloring, or tempera paints. EXPERIMENT with dyes and amounts of water until you get the colors you want. Remember that when sand is wet, it will be much darker than when it dries. Dry sand by spreading it out in the sun. Store the dry sand in jars, so you can see the colors, or in boxes. To paint: on cardboard or plywood, draw the picture you want to paint in outline form and decide on the colors. Mix white glue with an equal amount of water. Brush glue on picture, covering only the area for ONE color at a time. Then sprinkle that color of sand on the glue. Let stand a few seconds to dry, shake excess sand onto a piece of paper so that it may be returned to the jar for use again. Put lighter colors on first. Continue this process for all colors.

K. Figures made from driftwood or dead sticks.

L. Place mats and centerpieces for table decoration.

M. Picture designs using leaves, ferns, or rocks. (printing)

N. Charcoal Sketches from your Campfire - planning a campfire? Cooking your lunch out? When the fire has died down, rescue a piece of charcoal. Hardwoods are best - hickory, ironwoods, oak, locust. If you have taken along with you some rough surfaced paper, use that for doing some sketching. A smoothly sanded slab of wood will work nicely, too. No paper or slab wood? Look around for smooth bark or a flat stone. If you want to keep the sketch, spray it with a clear plastic spray or other fixative solution. To make a charcoal pencil, use a long stick of wood, burn the end, and write.

O. You may find a spider web wet with dew. If you are going to be out early in the morning, stow away a spray-can of paint and a few sheets of black construction paper. Spray the web lightly with the light-colored paint. Place the black construction paper under the web and then detach. A fascinating spider-web print. Make the print more permanent by spraying it with a clear plastic spray or other fixative.

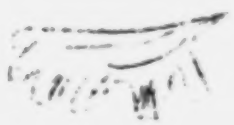
P. <u>Twig Animals</u>

Material: twigs (straight and forked), glue, string or fine wire, paint, dry grass or yarn if needed for tails, manes

Procedures:

(1) Gather twigs and other materials to make animals.

(2) Use a straight twig that has a smaller twig branching off at an angle to make the body (straight part) and the neck (smaller part). (Example No. 1)



(3) Fasten twigs together with glue and wrappings of string to form legs, ears, tails, and other parts.

(4) Paint on eyes or other features if needed. Use dry grass or yarn for manes and tails.

III. Pre-camp Activities

A. Discussion of conservation principles to use while gathering natural materials.

1. Groups should be careful not to take materials that will result in lasting injury to the area. (Reinforce skills of the Woodland Community.)
2. Never pick from the growing tip of a plant or tree.
3. Gather only those craft materials that you need.
4. Use your specimens from nature discriminately.
5. Respect for sources of craft materials may be developed by having the group set aside an area in which plants are grown specifically for use in the craft program.

B. Work with different art media: crayons, paints, clay, paper, etc.

C. Gather materials from nature: acorns, pine cones, shells, seeds, and grasses, and attempt to incorporate them into designs or pictures.

D. Discuss what might happen if conservation principles were disregarded when groups gathered craft materials.

E. Construct screens for screen printing.

F. Consult your WETA program guide for suitable programs on television.

G. Have scouts in your class display craft items they made in their troop activities.

H. Try any of the suggested nature crafts that seem appropriate for your class.

IV. Camp Activities

Children's interests, time, talent, supples that can be carried to camp, and your program will determine which of the Suggested Nature Crafts you will wish to use at camp. It is obvious they can not all be done. The choice is left to the children and the teacher.

V. Post-camp Activities

Most of the preceeding craft activities can be carried on back at school.

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OUTLINE FOR CREATIVITY

A. Nature of Creativity . . . . . p. 1

B. Purposes . . . . . p. 1

C. Background Experiences . . . . . p. 3

D. Pre-camp Experiences . . . . . p. 6

E. Camp Experiences . . . . . p. 8

F. Post-camp Experiences . . . . . p. 9

G. Bibliography . . . . . p. 10

A. The Nature of Creativity:

As we prepare to take a group of children on an outdoor education venture, we, of course, turn our thoughts to the studies of plants, animals, weather, and other areas of science -- and rightfully so -- but we often overlook an area which is as natural to the out-of-doors as is fresh air. This area is creativity -- creativity as can be expressed in the forms of art and writing.

Many times we find ourselves excluding this area on grounds such as the following:

1. I'm no artist; why, I can't even draw.
2. None of my children are talented.
3. I myself am just not creative at all.

Why do we use these reasons? Could it be, perhaps, that our understandings of creativity are not yet deep enough?

Rogers has defined creativity in this manner:

The creative process is that it is the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his life on the other.

We can all find justification for not concerning ourselves with the reasons given for excluding creativity, if we recognize from this definition that the key emphasis is on the process and not the product.

Creativity is not so much being able to produce a masterpeice as it is experiencing -- experiencing that which will bring self-realization to the individual. It is as much a way of thinking and feeling as it is of doing.

Can there be a richer or more satisfying environment for experiencing -- for creativity -- than that which one finds in the out-of-doors?

B. Purposes:

If the product is not our objective, what, then, will be?

Based on the definition of Rogers, the process could probably best be realized through these objectives:

1. To provide experiences which will develop in the child an awareness of self and the world as realized through:

curiosity
sensitivity
a sense of observation
reflection
originality
imagination
exploration
increased interests

2. To provide experiences which will develop an awareness and appreciation of the beauty of nature.

3. To provide experiences which will develop an awareness of seasonal changes as they affect creative expression and

mood
color
choice of media
observable objects

4. To develop in each child a sense of security in self-expression by:

a. Providing an atmosphere in which each child is accepted as he is, and in which he feels that he belongs, has status and the respect of both teachers and peers.

b. Helping each child to understand and accept himself and his own thinking.

c. Giving courage and confidence to each child to try, accepting the results whatever they are, encouraging him to evaluate and try again.

d. Providing freedom -- for a purpose, not freedom from responsibility but freedom to explore, to experiment with himself, with his environment, freedom to learn.

e. Always searching for alternatives, and helping the child to find "other ways," not to stick with the "obvious."

f. Listening to the child in order to understand his thinking and feeling, to see how the situation or the problem looks to him.

5. To develop within the child an understanding of what conservation in nature means.

6. To develop a sense of urgency and necessity for the individual to help conserve the natural beauties in his own environment.

C. Giving Your Students Background Experiences:

Relating to the objectives, we should consider the many possibilities for experiences prior to camp:

1. To develop the skills of observation and exploration:

   a. Take students on a walk around the school grounds; choose stations and "plant" certain objects or details which you desire the children to perceive in an observation; in this game of "I Spy", give clues as needed.

   b. Direct students in observing a setting: with the use of an opaque projector, flash onto the screen pictures -- or parts of pictures -- of various kinds of seascapes and landscapes in color (an excellent source of pictures is the "National Geographic" to which most school libraries subscribe); motivation for this experience could be as follows:

      ask for several volunteers to assist in a game, while the remainder of the class rest with their heads on the desks; cut off the lights and ask the volunteers to line up in front of the windows; give them the direction that all they are to do is look out the window for about five minutes; at the end of the designated time, ask each child to list what he saw as he stood looking out of the window (impress upon each that spelling is not of importance for this game); allow about fifteen minutes for this recall; itemize the various lists on the blackboard using tallies where duplication occurred; after the list has been put on the board, ask other members of the class to go to the window, one at a time, and add two additional observable objects; discuss with the class the importance of careful and close observation as a means of understanding a total setting.

      at a different session, we are ready to use the opaque projector: suppose we select the picture found on page 278 of the "National Geographic" for February, 1968; we might discuss, with the class as a whole, the following:

      (1) Objects which are present
      (2) Objects which appear to be soft (grass, straw, leaves, etc.)

      (3) Objects which appear to be rough (rock walls, roofs, building walls, etc.)

(4) Objects which are warm in appearance (straw, foliage, etc.)
(5) Objects which are cold in appearance (houses, stone walls, etc.)
(6) Colors which represent the warm objects (greens, yellows)
(7) Colors which represent the cold objects (grey, black)

present the following situation to the children: If you were painting this picture and you desired to make it warmer in appearance, what could you do? (paint the roofs orange or yellow; paint the walls white; add more grass and some flowers)

NOTE: Situations could also be presented in which we might discuss making a setting appear drab or cool in appearance.

The above points for observation could be charted and placed in a viewing corner with a great number of pictures so that the students could work alone or in small groups; the pictures might be numbered in some way, and possible responses could be placed on correspondingly-numbered cards for the children to use as a study guide.

The following list of sources in "National Geographic" might serve as a "starter grouping":

January, 1968 -- pages 42, 116-17, 127, 128, 130-31
February, 1968 - pages 154, 258, 279, 283
September, 1968 - pages 335, 377, 387
November, 1968 - pages 647, 660-61, 711
December, 1968 - pages 776-77
January, 1969 - pages 22-23, 36, 39, 84-85, 93, 107

2. To develop the skill of sensitivity to sounds, touch, and smell:

a. With the use of the tape recorder, provide opportunities for students to experience all kinds of sounds (a recommended tape or record is "Sounds Around the Home and School", Ginn & Company which is available at the Materials Center). If the tape or record does not seem to be challenging to the students, we might try making our own -- let the children suggest sounds which might be heard in nature, and then offer the challenge for each child to select one sound from the list, study the sound from reality, and devise a manner to reproduce it artificially; with the assistance of each child, then, a recording could be made to be used in the classroom.

b. Discuss with students the following concepts of touch:

furry	rough	damp	soft	velvety	"gooey"
slick	sticky	prickly	slimy	tacky	

Encourage small groups to prepare a sample of each of these concepts, and place their preparations in shoe boxes with one end cut out; place the correct answer in an envelope attached to the box; other members of the class can then at their leisure examine, identify, and check themselves.

c. Set up a "Smelling Center"; place substances, or a representation of them, in the center; if it is a representation, use a picture of the substance and label a jar containing the proper odor; for example:

(1) an onion and a piece of garlic
(2) a picture of a stagnant pond (allow water in a jar to become stagnant)
(3) a pine branch placed in water
(4) a piece of cedar wood, etc.
(5) samples of various spices
(6) sassafras leaves

3. To develop the skills of reflection, originality, and imagination:

a. Through the use of a setting in a picture for motivation:

We might choose the picture found on page 138 of the "National Geographic" for August, 1968; after flashing this picture on the screen with the use of the opaque projector, we could set the stage with the following commen...

These men are coming to tell us of several events which could possibly occur in this setting:

(1) a great flood is coming and as a result a "world of the past" will be revealed
(2) there are hundreds of bulldozers, trucks, and workmen approaching from the other side of this hill
(3) a number of planes are nearing and each one is going to drop millions of plant seeds from a neighboring planet

(4) a very thick, dense fog will pass over this setting and leave in its path an enchanted forest

Ask each child to choose and write down one of these events which he would like to show through art; on the basis of the responses, form groups to work on murals; provide for ample time in which they might plan together; they should decide on objects to be included, colors to be used, and a selection of medium or media.

b. Through the experience of writing - Japanese Haiku:

A 17-syllable Japanese haiku is an excellent poetic form through which we can develop these skills of reflection, originality and imagination. It is an art that produces overtones in word pictures with a minimum of words. Haiku reflects on the simplicity and beauty of nature - this is why it is so conducive to creating in the out-of-doors.

D. Pre-camp Experiences

Before having children create haiku in an outdoor experience, we need to develop some of the techniques for this type of poetry.

1. We could use the following poem, which is an example of haiku created by a sixth grade child in an outdoor experience, to develop an appreciation for haiku.

   a. Have children read it silently.

   b. Discuss which sensory images it appeals to most strongly.

   c. What visual images are suggested?

   d. What mood or feeling is created?

M O U R N I N G

Rain falling from the

winter tree. Is it weeping

for its dying leaves?

Robin Dores

2. We could also find an example of published haiku from such sources as Harry Behn's Cricket Songs: Japanese Haiku and Richard Lewis' The Moment of Wonder.

   a. Have children discuss images in the poem.

   b. Have children discuss contrasting elements in the poem.

   c. Call attention to how much is implied in so few words.

   d. Discuss what attitude toward life the poet is conveying.

   e. Develop the understanding that haiku is usually drawn from some part of nature. It can suggest.

seasons	moods through feeling
time of day	moods through scent
moods through color	moods through sound

   f. Discuss the following characteristics of haiku forms:

      (1) It is usually seventeen syllables long.
      (2) It is written in three lines (five, seven, five)
      (3) It is word pictures which suggest an idea or feeling.

3. Now let us explore the possibility of using the following as motivation for encouraging children to try their hand at writing some haiku.

   a. Provide a solitary and reflective atmosphere. (Turn out the lights, play soft music, rest heads, etc.)

   b. Without any discussion play the "Cloud Burst" excerpt from Grofe's Grand Canyon Suite. (Music teacher should have this).

   c. After encouraging the children to reflect on the following ideas, play the same excerpt again and ask each child to describe his mood in one word on a piece of paper. When the music is finished, collect the words and list them on the board. (They will use these words when writing their haiku.)

   d. Play another excerpt from the Grand Canyon Suite. (Sunrise, etc.)

4. Invite the children to listen quietly to the music and reflect again in hopes that they will feel inspired to create haiku about some small marvel of nature that has been impressed upon them by the music - encourage them to use words which have been listed if they feel so inclined.

5. When the children have had ample time to linger over and enjoy this experience, you might invite them to read their favorites aloud to the group.

6. Children enjoy creating art to go along with their haiku. (Check published sources.) This can be done using many art media (water color, chalk, tempera, etc.)

E. Providing Experiences at Camp:

Creating Through Art

We are now at camp and the children are ready to benefit from first-hand experience with nature.

What materials should we have on hand?

Our students will vary with choice of media and we should be prepared to offer several; suggestions and materials needed would be as follows:

Sketching: drawing paper, charcoal, colored chalk, or cray-pas
*wooden boards (available at camp)

Oil Painting: oil paints (add boiled linseed oil to powdered tempera until it is the consistency of toothpaste; stir until smooth and keep in a tightly-covered jar)

brushes; turpentine for cleaning the brushes

palette knives (available at camp)

cardboard squares (these could be made more interesting if covered with one layer of cheesecloth - glue on the cloth by painting with a mixture of ½ Elmer's glue and ½ water

pie pans for use as "palettes"

*wooden boards (available at camp)

*to these boards the art paper may be thumb-tacked

We might begin this activity by taking the group for a walk and ending up at a pre-selected spot -- one selected on the basis of probably satisfying the interest of any one of the members of the group; such a spot would include water, trees, and long distance viewing as well as close-up viewing.

Discuss with the children what they observe -- colors, moods, detail, etc.; ask them to choose an object or part of the setting which interests them most, choose one medium or a combination of media, and express their "interest spot" through art; impress upon them the fact that their work not necessarily need to be completed if time does not permit.

If they have not experienced oil painting -- especially with the palette knife -- we might challenge them to explore this medium only, or in combination with another.

Encourage the children to work alone; allow them to disperse in the area if their interest warrants.

Creating with Haiku

1. As motivation, take children on a silent walk, encouraging them to absorb all they can from the moods of nature.

2. After sufficient motivation, have them go off by themselves and write haiku.

3. Make various art media available so they can represent their images pictorially after they have represented them with words.

4. Using rice paper or some other materials, have the children neatly letter and illustrate their haiku. Mat the haiku on colored paper or material which helps convey the "author's message".

F. Bringing Our Outdoor Experience Back to the Classroom:

The experiences of children become meaningful if we allow for enriching follow-up both immediately upon return as well as throughout the remainder of the year.

a. Post-camp experiences in art:

(1) Work with the children in setting up displays in the library, hallway, etc.

(2) With the use of pictures from the "National Geographic", provide opportunities for students to imagine a setting as it might look during another season in a different geographical location, etc., and choose an art medium to express this transformed impression.

(3) If a wooded area is within walking distance, provide for further experiences in that location.

b. Post-camp experiences in Haiku:

(1) Make a display of the finished haiku in the halls, library, etc.

(2) Prepare a filmstrip, using the finished haiku. Prepare sound that reflect the idea of the poem. Tape the sound effects along with the poets reading their haiku. Coordinate this with the filmstrip.

(3) Have the children read more haiku and create more of this type of poetry. Provide opportunities for them to share the poems they particularly enjoy.

G. Bibliography

Harry Behn's Cricket Songs: Japanese Haiku

Richard Lewis' The Moment of Wonder

Carl Rogers On Becoming A Person

OUTLINE FOR THE TEACHING OF WOODLAND CAMPING

AND SURVIVAL TECHNIQUES

I. Purposes . . . . . p. 1

II. Scope and Sequence . . . . . p. 1

III. Background Information , ...

A. Overview . . . . . p. 3

B. Have a Safe Outing (safety hints for outdoors) . . . . . p. 4

C. Call of the Wild (tent camping) . . . . . p. 5

D. Axe, Knife and Saw (their use) . . . . . p. 12

E. Improvise (camp crafts) . . . . . p. 18

F. Free When You Need It (survival) . . . . . p. 19

IV. Pre-camp Activities . . . . . p. 24

V. Camp Activities . . . . . p. 24

VI. Post-camp Activities . . . . . p. 24

VII. Bibliography . . . . . p. 25

I. Purposes

A. Develop an awareness of safe procedures for outdoor activities.

B. Introduce procedures and crafts that aid the individual in planning and conducting a successful tent camping experience for any season.

C. Prepare students for emergency survival in the natural environment.

D. Develop an awareness of good conservation practices in the use of natural resources for recreational or educational activities.

II. Scope and Sequence

The material presented here cannot be covered or experienced in one session. Experiences must build upon prior experiences. Many of these skills can be successfully taught to young children in the primary grades and built upon year by year.

A. Overview

B. Background Information

1. Safety hints for outdoor activities

a. Pre-planning

b. Hints for the class campout

2. Tent camping

   a. Planning a Class Campout

   b. Selection and Preparation of a Site

   c. Fire Building

   d. Cooking

   e. Clean up and Sanitation

3. Camp Tools and their use

   a. Axe

   b. Knife

   c. Saw

   d. Rope

4. Camp Crafts

   a. Utensils and Containers

   b. Furniture and Cooking Aids

   c. Tools

5. Survival

   a. If you are lost

   b. Emergency kits

   c. Shelter

   d. Fire

   e. Food and water

III. Background Information

A. Overview

Most of man's existence has been spent in close contact with the natural environment. But modern living has removed large segments of society from close contact with the land. A need has been created for man to learn about his natural environment, his role within the natural environment, and to acquire the skills and appreciations to fully enjoy some of the values of his original habitat. Tent camping places the student in a position to experience and appreciate more fully his environment.

There are several types of school camping experiences that may be planned by the teacher in cooperation with supervisors, administrators and parents. Some suggested activities are the day camp or laboratory, camping clubs and overnight campouts.

During the study of camping skills, conservation principles affecting living plants, animals, water, soil and natural beauty should be practiced and encouraged.

B. Have a Safe Outing

Safe outdoor experiences do not often happen by chance. They are the result of prior planning and recognition of the limitations of your abilities and the limitations of your equipment.

B. Have a Safe Outing (safety hints for outdoors)

1. Pre-planning

a. Let others know where you are going and when you plan to return.

b. Go prepared for weather conditions affected by the season, altitude and daily changes.

c. Carry an emergency kit designed for your activity.

d. Know the area where you are going through the use of maps and the questioning of previous travelers and local residents.

e. Use the best equipment possible and be sure it is in good working order.

f. Become as skilled and as knowledgeable as possible in the activity.

g. Make a list of necessary items to take.

2. When You Are Outdoors

a. Don't take unnecessary chances.

b. Keep cutting tools sharp and in cases when not being used.

c. Travel in pairs or larger groups for added safety.

d. Be extra careful of the extremities: feet, head and hands. Have a hat handy. Treat injuries to the hands; they heal slowly. Keep feet dry and clean.

e. Maintain optimum body temperature. Loss of body heat can be severe from an exposed head (up to 80% of total heat loss). Avoid over heating on either warm or cold days.

f. Maintain body fluid levels. Loss of body fluids is dangerous if not replenished.

g. If you think you are lost, you should stop where you are. Think through your situation. Make camp if necessary. Try to signal for help. Wandering around will not help.

C. Call of the Wild (Tent Camping)

1. Planning a class campout

a. Choose type of campout

— (1) day laboratory
(2) overnight

b. Prepare a list of personal equipment with the students with the following suggested headings.

(1) Toilet kit - comb, soap, towel, etc.
(2) Personal Kit - camera, flashlight, pocket knife, etc.
(3) Clothing - extra shoes, change clothes, poncho, etc.
(4) Camping items - pack, tent, mess kit, etc.
(5) Food - done in groups of 4-6 students

c. Prepare a class equipment list of items to bring for the whole group.

d. Hints for the class campout

(1) Use two man tents if possible. Children are less boisterous at night in small groups.

(2) Have students pair up for camp chores. Taking turns at fire building, cooking and dish washing.

(3) Groups of four students could plan their own menus and cook as a team.

(4) Set up class stations for handwashing, dishes and drinks.

(5) Limit knives to a pocket knife to be used with the axe in camp skills classes or whittling projects.

(6) The teacher should have a central match supply for the class campout but each student should be taught to have an emergency water proofed match supply stashed in his pack. These could be made as a class project.

(7) The boys' and girls' tent areas could be separated by the adult leaders' tents.

(8) Get a camping permit or permission for use of the camping area.

2. Selection and Preparation of a Camp Site

a. The three primary requirements of any camp site are: water, wood and reasonably flat ground.

(1) Water should be within carrying distance of camp. Any water of doubtful purity must be boiled for five minutes or purified with chemicals! Tablespoon chlorox per gallon water.

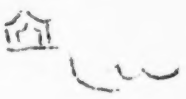
Dead wood

(2) When possible, pitch camp near "dead-fall". These are trees (preferably hard wood) that have blown down and have remained off the ground sufficiently to be dried out and usable for firewood.

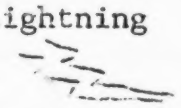
Slope dangers

(3) When searching for level ground, consider carefully the prevailing wind direction, the presence of overhead dead trees or limbs, the nearness of clear slopes that pitch rocks, snow or water runoff your way and any present or possible water levels in any nearby stream or lake.

Water levels



Lightning



b. Choose a flat, gently sloping area at a medium elevation. High places are windy. Low areas collect cold air and fog. Areas too close to streams or lakes can be damp and are generally inhabited by biting insects and can be affected by flash floods.

Insects

Poisonous Plants

c. Lone trees and tents staked in open fields attract lightning. Pitch camp at the edge of a clearing.

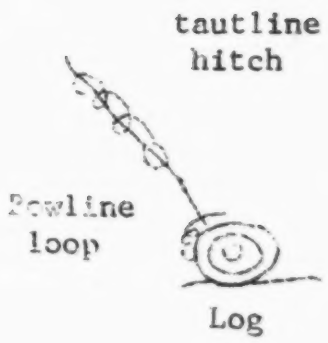
d. Avoid areas where poison ivy and other poisonous plants are found.

e. Pitch the tent correctly. Place back of tent to prevailing wind. Use sturdy poles and white lines. Stake carefully. A tent with no floor should be ditched when pitched on hard ground.

adjustable slide

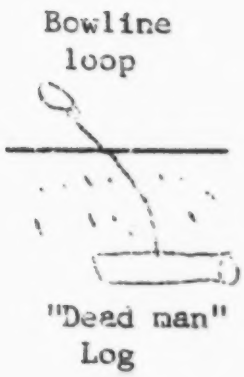
f. A good nights sleep is dependent on making your bedding as near the comfort level you are accustomed to. Clear the ground of rocks and stumps. Pad the area under your bed roll.

tautline hitch



g. Staking the tent can be a problem on snow, frozen ground, rocks and sand. On hard ground or snow use rocks, trees and logs to attach tent ropes. Pitching on sand requires the use of buried anchors.

h. An extra tarp supported over the tent roof will keep your tent drier and insulate it from heat and cold. For snow, this tarp should be supported with poles.



i. The usual order for the preparation of a camp site is:

(1) Latrine or toilet locations.
(2) Set up tents and lay out sleeping bags.
(3) Collect firewood and make fire places.
(4) Draw water

3. Fire Building

a. The three essential ingredients for combustion are:

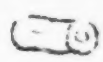
1. Fuel - any material that will burn.
2. Heat - hot enough to ignite the fuel.
3. Air - provides oxygen for the combustion process.

b. Fuel must be placed on the "fire lay" in the order of its size.

1. Tinder - thin dry material that flares up when a small amount of heat is applied. Examples: dry pine needles and grass, shredded bark, and twigs.

2. Kindling - material that ignites from the heat of the tinder. Examples: twigs or split wood about fifteen inches long that vary in size from the thickness of a pencil to that of one's thumb.

3. Fuel - any material larger than kindling. Examples: branches or logs.



Oak-hardwood

Pine-softwood

c. Fuel is selected where possible to match the intended use of the fire.

(1) Hardwoods produce high heat and generous coals. They are slow burning and excellent for cooking. Deciduous trees, those that lose their leaves in the fall, are usually hardwoods.

(2) Softwoods do not produce as much heat as hardwood, but they ignite easily, burning brightly and quickly. Softwoods are good for starting fires, but they tend to smoke, pop and throw sparks. Evergreens are generally considered softwood trees.

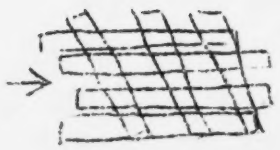
d. Carefully select and prepare the fire place considering the following hints:

(1) Have all tinder, kindling and fuel ready and covered.
(2) Choose an area free of over-hang trees, exposed roots, and large quantities of leaves or bushes.
(3) Clear an area six to ten feet in diameter of all flammable materials. Dig down to mineral earth.
(4) Prepare to take full advantage of available wind being careful to prevent high winds from scattering the fire.
(5) Position logs, rocks or stakes to support cooking pots.
(6) Build your "fire lay" with tinder, kindling and fuel in place before striking a match.
(7) Keep a bucket of water handy to reduce flames for cooking or to douse a runaway fire.

e. Prepare a fire lay

(1) The tepee fire lay is especially good for starting fires and one pot cooking. Place kindling vertically around tinder in Indian tepee fashion.

wind



(2) The <u>crisscross</u> or log cabin fire lay is usually combined with a tepee lay starter for creating a hot bed of coals. Space sticks apart sufficiently for air to enter.

(3) The <u>reflector</u> fire lay is efficient for baking and for casting heat toward a tent. The tepee and crisscross lays are given a reflecting wall of stone or logs.

wind

(4) The <u>altar</u> fire is built upon a platform of logs, earth or rock to raise the fire out of snow or mud, or to raise the fire to a comfortable cooking height.

(5) The <u>trench</u> and <u>hunter</u> fire lays are built within containing walls of dirt or logs. They are very efficient small fires that work well in windy conditions. Make them just wide enough to place cook pots across.

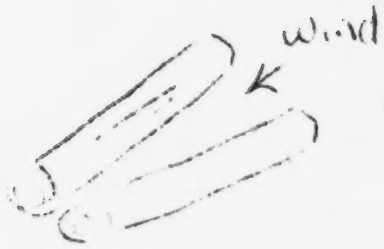
f. Lighting the fire

(1) Have all firewood ready.

(2) Allow sufficient ventilation through the fire lay.

(3) In wet weather, shield the fire lay until the wood catches well. A candle or a squirt bottle of kerosene will help considerably.

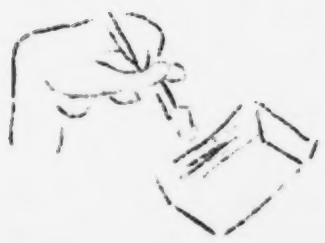
trench



(4) Keep your back to the wind and light your tinder on the upwind side.

(5) Support the match between your thumb, fore finger and middle finger while striking the match. A kitchen type match with wooden stem can be struck on any dry, rough surface, including a zipper.

hunter



(6) Shield the match from the wind by cupping the hands around it. When the stem is burning well, place the match to the tinder.

g. Camp Fire Hints

(1) Keep the fire small so that you can get close enough to tend it and cook. Children tend to build large fires.

(2) Never leave a fire unattended. The fire builder should stay with it.

(3) Teach students to keep their distance from the fire. Some clothing will ignite before any great heat is felt by the person.

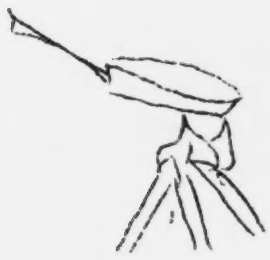
(4) Watch out for flying sparks. They are a threat to the woods, tents, sleeping bags and clothing.

(5) When finished with the fire, make sure every ember is out. Douse it with water, stir and douse again. Cover with dirt.

4. Camp Cooking

a. Frying

The quickest and easiest way to prepare many camp foods including bread is frying. The skillet is your most useful tool in camp cookery. Vary frying techniques.



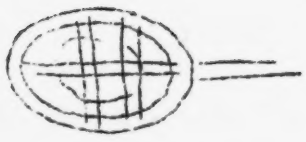
(1) Pan-fry - uses hot grease in moderate amount to fry meat.

(2) Sauteing - uses very little grease. Sear all sides of meat quickly, then lower heat.

(3) Pan-roasting - add warm water, cover with lid and simmer slowly.

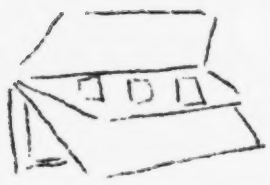
(4) Fry bread - biscuits, bread and pancakes can be fried in a skillet with small amounts of fat. Turn to brown both sides or prop up top to fire.

b. Broiling



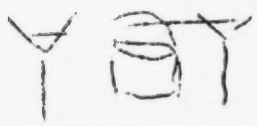
Broiling allows food to be held directly over or to the sides of a good coal fire. The food may be suspended on a grill, stick, or plank of wood. Grease is allowed to run out of fatty meats, but must be added to dry meats.

c. Baking



Baking is more difficult and takes more time than other camp cooking methods. A reflector oven can be used for breads, pie and cakes. A camper's stew can be wrapped tightly in aluminum foil and baked in coals. Vegetables, eggs and meat can be wrapped in wet leaves, mud or aluminum foil and baked in coals.

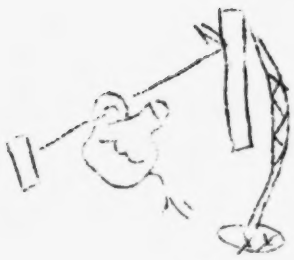
d. Boiling



Boiling uses hot water to cook meat, vegetables and eggs.

5. Clean up and Sanitation

Care must be taken in cooking and eating outdoors to keep hands and pots clean to prevent stomach and bowel distress.



a. Set up a central hand washing station or stations near the cook area. Hang a bleach bottle with an elevated hole so that it may be tipped without assistance. Soap can be suspended alongside in a nylon stocking.

b. Immediately after cooking, two large pots or cans should be hung over the fire to heat wash water. One pot is for washing dishes, the other for rinsing. Dishes and silverware rinsed in boiling water need no drying.

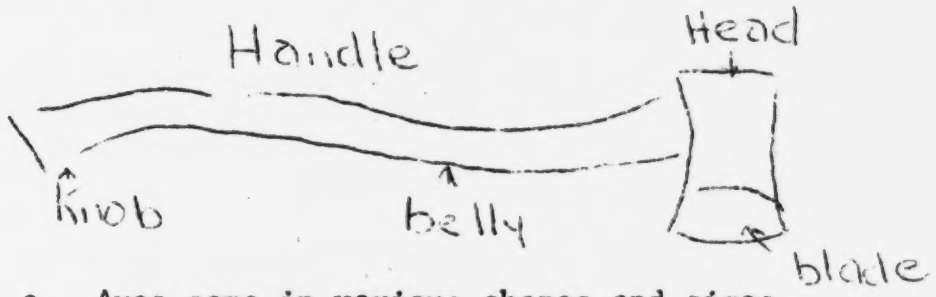
c. Food, dishes and utensils should be covered when not in use.

d. Axe, Knife and Saw (Their Use)

Basically, camp tools should be kept sharp, clean, oiled and stored in their proper cases. With a little care, they will serve you well.

1. Axe

The axe is the basic wilderness tool. With it a woodsman can fashion shelters, make a raft or canoe, prepare game for cooking, and chop wood for the fire. Whatever model or size is chosen, buy the best you can afford.

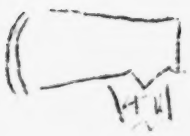


a. Axes come in various shapes and sizes.

(1) A hatchet weighs one pound or less and has a handle about 12 inches long. It is satisfactory for short camping trips and light chopping chores. A hatchet is best used one handed and is therefore not very satisfactory for children.

Hudson Bay

(2) A <u>junior</u> axe is more substantial than a hatchet with a single bit head weighing 1¼ to 1½ pounds and a handle from 14 to 16 inches. This is the proper size to teach axemanship to children. It is also good for the camper with medium chopping chores like splitting firewood.



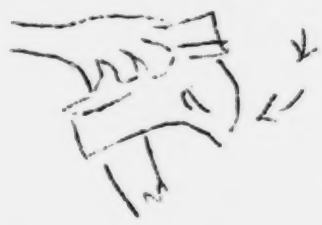
Kentucky Single-bit

Michigan Single-bit

(3) A full size axe is the size needed for heavy weight chopping chores like falling trees and splitting logs. The head comes in a variety of styles, weighs 2½ to 3 pounds with a handle 28 to 36 inches. The Hudson Bay model handles very well.

Michigan Double-bit

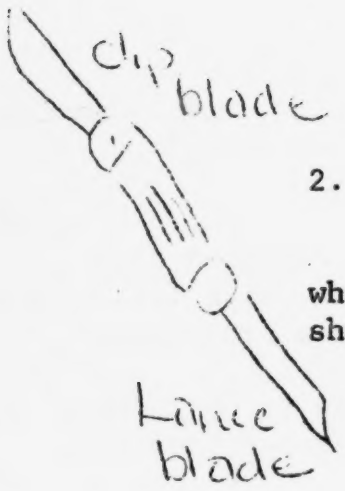
b. To sharpen an axe, use a file to take out nicks or to thin the blade and finish the edge with a whetstone.



c. When chopping, spread the feet; take a solid stance and swing with two hands. The width of the cut should be the same as the thickness of the log. Cut at an angle to the grain.

d. To split a fire place length log, lean the log on the far side of another log as a chopping block. Take a full swing and hit the center of the log in the same direction as the grain.

e. To split kindling with a hatchet, place the head on the end grain, and lift wood and hatchet together. Strike the opposite end of the wood on a chopping block.



2. Knife

The ideal knife for the camper has a small, keen blade for whittling and small cutting jobs. A regular jackknife with two sharp, slim blades that fold into a durable case is ideal.

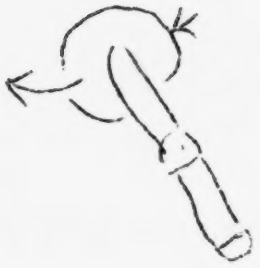
a. Suggestions for purchasing a knife

(1) Select a knife with both a clip blade and a lance blade. The clip blade is better for whittling and the lance blade is better for drilling holes.

(2) The blade should be made of bolstered steel, nickle, or German steel. No more than two blades are necessary.

(3) The handle should be as long as the width of your hand and be constructed of brass and bone.

(4) Buy a name brand like Case, Shrade or Queens.



b. To sharpen a knife, use a whetstone, stroking toward the edge only and finish the edge on a leather strap reversing the direction.

c. Follow these rules in using a pocket knife.

(1) Keep the blades sharp.

(2) Whittle away from you, until you are an expert.

(3) When whittling, sit down, spread legs, keep wood away from legs or body.

(4) Grasp the handle of the knife firmly. Push with your whole hand, not your thumb.

(5) Cut where the blade is rounded.

(6) Close the knife when the job is finished, when you walk around, or when you hand someone else the knife.

3. Saw

The bow saw has a definite place in the camper's pack. It will cut firewood faster and safer than an axe with little waste. However, it will not split firewood or drive a tent stake.

a. Bow saws come in sizes from 12 inches to 36 inches. A blade 16 to 20 inches is fine for average camp use.

b. Some models of bow saws fold up to fit in a hiker's pack.

c. A saw is sharpened with a narrow file. It is not easy and it takes a good deal of experience to do a good job. Sharpening the large teeth on a bow saw is dangerous. Wear heavy leather gloves.

d. Follow these rules in using a bow saw:

(1) Carry the saw with the blade sheathed.

(2) Work away from others.

(3) Use a sawbuck or a support when a log is sawed.

(4) Angle the saw down.

(5) Use long steady strokes. A saw will pull itself down through the wood.

(6) Keep your extra hand away from the cut.

4. Rope

The camper needs to know several knots and hitches. Rope is an indispensable tool in camping.

a. A useful knot or hitch

(1) is easily tied.

(2) will hold until you untie it.

(3) is just as easily untied.

b. Ropes fall into two general classes.

(1) Laid rope - strands twisted together.
(2) Braid rope - strands are interwoven.

c. Depending on its size and use, a rope may be called a line, a sheet, a hawser, or a cord.

d. When describing knots, the manipulated end is the running end and the other end, usually tied to some object, is the standing part.

(1) A bend or knot joins two ropes or the ends of the same rope.

(2) A bight is a loop in a rope.

(3) A hitch implies tying the tope to some other object.

(4) A round turn is a complete turn of the rope around some object.

(5) Lashings are multiple turns around logs or poles and secured with knots or hitches.

e. Common Camp Knots

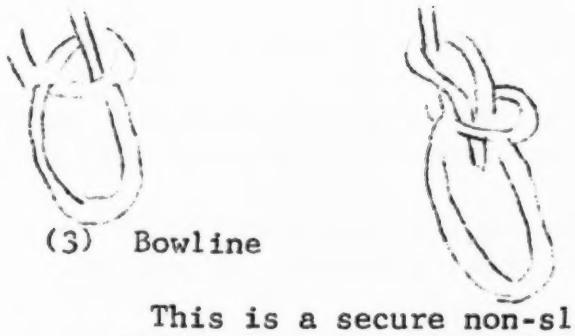
(1) Square or reef knot

(a) The square knot is used to tie the two ends of a rope of the same size together where mild tension must be kept on both ends as around a package. Both running ends must come out on the same side.

(b) The surgeon's knot is a variation of the square knot with two turns around on the first part of the square knot made to hold all tension.

(2) Figure 8 Knot

This knot is a stopper knot used as a substitute for whipping the ends of a rope or as a stopper to keep an object or another knot from slipping up or down the rope.

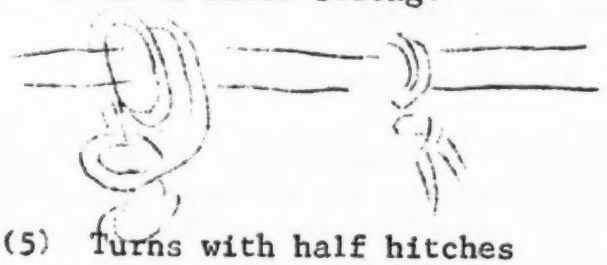


(3) Bowline

This is a secure non-slip knot for tying a loop around an object. It may be untied easily, even after great tension has been applied.

(4) Clove hitch

This secures a rope to a post, stake or tree. It may also be used to close the neck of a bag. An extra turn around the post on the last loop makes the hitch extra strong.



(5) Turns with half hitches

A very simple knot that holds a rope end securely to a post or a ring. The extra turn around the post make the hitch more secure.

(6) Sheet Bend

This knot secures two ropes together of different diameters or of the same diameter as well. It is easier to untie than a square knot. Again a second turn around under the keeper would make this knot more secure.

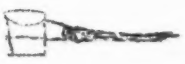
(7) Tautline hitch

This knot forms a fairly secure hitch that is adjustable without being untied. It is most often used to adjust a tent rope.

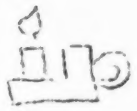
E. Improvise (Camp Crafts)

Many inexpensive and very useful camp items can be made before or during a campout.

1. Utensils and containers can be made from tin cans and wire.

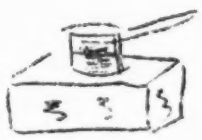


2. Ladles, cups and spoons can be made from small tin cans and shells with split stick handles.



3. Candle lanterns can be made from small tin cans.

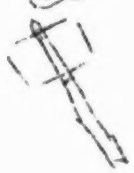
4. Grills and reflector ovens can be made from wire or green sticks covered with aluminum foil. They may also be cut from large oil cans.



5. A variety of wood stoves and ovens can be made from oil cans (square and round) and old metal buckets.

6. Tables, platforms, tripods and seats can be made of lashed poles.

7. Arrowheads and primitive knives can be chipped from stone or glass.



8. Chopping, hammering and digging tools can be fashioned from stones on a split stick.

9. Rope and twine can be woven from bark and vines.

10. Woven baskets can be made with split wood stiffening around which is woven vines, bark or grass.

F. Free When You Need It (Survival)

Anyone at any time can suddenly find himself dependent on his own resources for survival. Emergency situations such as fire, transportation breakdown, storm, mental stress, being lost, and war sometimes separate man from the crowd and require him to depend upon his own resourcefulness in the wilderness.

Nature has provided every necessity for man's survival and comfort if he knows where to look for it and how to use it. These necessities are food, warmth, shelter and clothing.

Your capacity for survival is mainly dependent upon your familiarity with the natural environment, the temperature of your surroundings, your physical capacity, the amount of safe water available and your mental attitude.

1. If you are lost

   a. Stop when you realize you are lost. Stay put and calm.

   b. Busy yourself with a simple task like building a fire while you consider your next course of action. Do not wander around.

   c. If you decide to travel, leave a message behind indicating your condition and direction. Mark your trail so you may return or be followed.

   d. Maintain a comfortable body temperature with clothing, windbreak, shelter, and fire.

   e. If darkness is approaching, make camp.

   f. Try to signal for help with smoke, light, noise, or some other visual signal.

2. Emergency Kits

The person with the best chance of survival is the one who plans for any contingency. Some basic survival items should be stored or carried in our homes, cars and during our recreational pursuits. A basic kit might contain:

a. Blanket, coat or sweater

b. Water and purification tablets

c. Waterproof matches, candle, and plastic bottle of kerosene

d. A first aid kit which also contains some coins.

e. Some rope and a square of waterproof material

f. Some high-energy, light weight food.

g. A pocket knife, compass and whistle.

3. Shelter

The modern light weight plastic sheeting is ideal to carry in your emergency gear to combine with natural materials in the construction of a shelter. Basically, a shelter should be dry, protected from wind, safe, and small enough to be heated.

a. Caves and protective ledges are still to be found, but they must be warmed by a fire in cold weather.

b. In cold weather the ground must be warmed by a fire or insulated well before constructing a shelter.

c. Use dry leaves, grass or evergreen boughs to make an emergency bed about two feet thick.

d. If you have brought your poncho or plastic sheeting, a small lean-to can be quickly constructed. Without these materials use evergreen boughs, cattail reeds or similar materials to thatch a steep roof.

e. Snow shelters are easily constructed. Make them sturdy and ventilated with a padded floor.

snow burrow

4. Fire

When you lack matches for that very desirable fire in an emergency situation, try to think first of easier methods than those used by Indians and Boy Scouts.

a. Flammable fuel from motors will aid fire making greatly. Saturated tinder can be ignited with sparks from ignition systems and batteries.

b. A magnifying lens can be used to ignite very dry, fine tinder. Lenses can be detached from binoculars or camera to focus the sun's rays.

c. A large bore rifle, shotgun, or pistol shell can be fired minus the bullet into the air to ignite a dry cloth wad stuffed lightly into the muzzle.

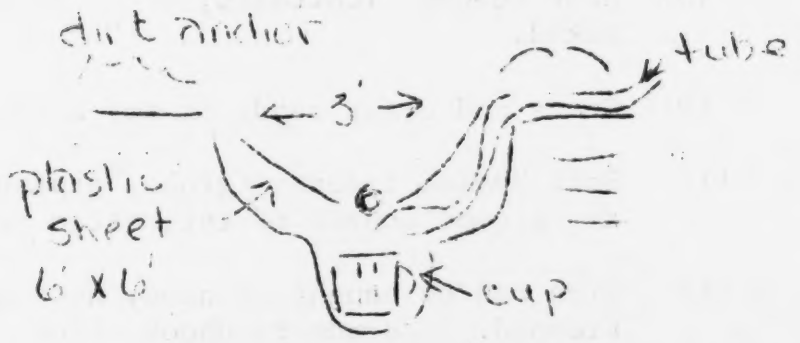
d. Flint and Steel, and Bow and Drill methods of fire starting were successfully used by the Indians and pioneers but successful imitations are rare, though challenging, without a good deal of practice. Children would enjoy trying to learn. Consult several good guide books.

5. Food and water

Water is most important to survival. You must have two quarts of water each day to maintain efficiency. If water is scarce, do not eat. Digestion uses water.

a. Water purity is difficult to judge, play safe. Boil all suspect water. Heat kills germs, cold does not. Melt snow; do not eat large quantities of snow.

b. There are a variety of techniques for finding water under dry conditions such as digging in low spots where water may collect under the surface. One modern technique is a solar still. Condensation collects on the under side and drops into the cup.



Dig hole 2' deep
3' across

c. No reasonable food should be overlooked in emergency situations. It is no time to be squeamish. Fats are extremely important to good health in wilderness survival.

(1) Nuts are a good source of protein. They digest better if roasted or cooked.

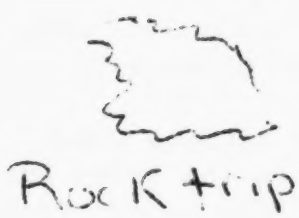
Dandelion

(2) Berries of the rose family are a good source of Vitamin C (rose hips, blackberries, raspberries).

(3) Inner tree bark (especially evergreens) can be eaten raw or boiled to make tea.

(4) Many local field greens are delicious (Dandelion, Lambs Quarter, Plantain, fireweed).

(5) Some flowers have sweet juices (clover, rose, honeysuckle). Buttercups are poisonous.



(6) Lichens are the low, variously shaped, grey, brown, or black plants growing on rocks and stumps. Although not very tasty, they are very nutritious in soups.

(7) Mushrooms should <u>not</u> be considered for survival food because the poisonous varieties are difficult to tell from the non-poisonous.

(8) Root tubers (cattails, water lily) are boiled or baked.

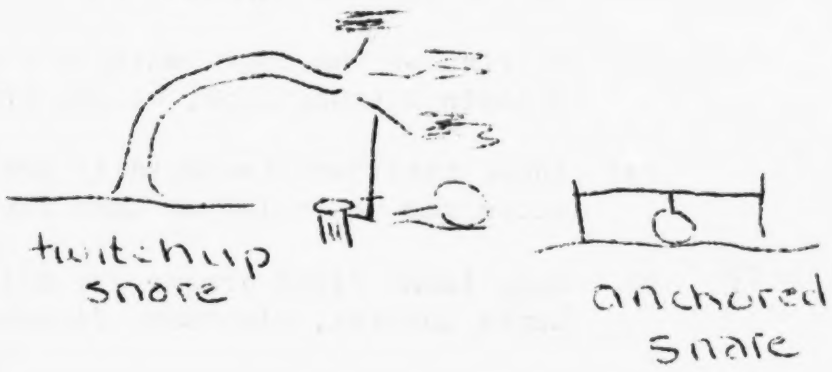
(9) Grass and grass seeds of any kind are edible.

(10) Soft bodied insects (grubs, grasshoppers, crickets) are a good source of fat, eaten raw or cooked.

(11) Fish can be caught by hand, netted, speared, or trapped. A crude fishhook, line, and bait can be rigged from natural materials.

(12) Seaweed and algae are edible, preferably boiled.

(13) Small animals can often be trapped or snared easily.



(14) Birds, snakes, lizards, and frogs are edible.

IV. Pre-camp Activities

A. Plan and prepare equipment for a campout.

B. Have a cookout.

C. Improvise and make camping equipment.

D. Play search and track games.

E. Identify and gather edible greens around the school.

F. Make up an emergency kit for use in camp, car, or home.

G. Sharpen axes, hatchets and jackknives.

H. Prepare a "Possible Sack" for field activities at camp. Include magnifying glass, collecting bottles, plastic bags, plaster of paris, field guide, binoculars, insect net, notebook, etc. in a shoulder or belt pack.

V. Camp Activities

A. Set up a day laboratory camp.

B. Conduct an overnight campout in schoolyard, park or Camp Letts.

C. Make an auxiliary survival camp with improvised shelters and equipment.

D. Set snares and traps for rodents (check with game warden).

E. Collect and prepare edible natural materials for a lunch.

F. Play games and contests using camping and survival skills.

VI. Post-camp Activities

A. Make a camping and crafts display at school. Include photos.

B. Put on a camping, crafts, survival P.T.A. program. Include possible movie film of students taken at school and camp.

C. Initiate a camping club or workshop at school.

D. Use older students to teach younger students at school.

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Films

297 Shelter 1-6
350 I'm No Fool With Fire 1-3
703 Chaporral Classroom - Camp Preparation
731 Shelter 1-3
1044 Fire What Makes It Burn
1376 Camping, A Key To Conservation

OUTLINE FOR THE TEACHING OF WATER SAFETY

I. Purposes . . . . . p. 1

II. Scope and Sequence . . . . . p. 1

A. Overview . . . . . p. 2

B. Rescue and First Aid . . . . . p. 2

C. Swimming . . . . . p. 2

D. Canoeing . . . . . p. 2

III. Background Information . . . . . p. 3

IV. Pre-camp Activities . . . . . p. 11

V. Camp Activities . . . . . p. 12

VI. Post-camp Activities . . . . . p. 13

VII. Bibliography and Resource List . . . . . p. 14

I. Purposes

A. Become aware of the potential hazards of various swimming areas and be prepared to cope with these hazards.

B. Learn and improve basic swimming techniques and overcome some individual fears.

C. Learn to launch, propel, maneuver and stop a rowboat or canoe in partnership with another person.

D. Learn to assist someone in trouble with simple rescue techniques from shore, dock or boat.

E. Become aware of the special hazards involved when the water is cold.

F. Acquire trust in the support capability of a life jacket and understand when it is necessary to wear one.

G. Know how to recognize the signs of cessation of breathing and be able to give mouth-to-mouth resuscitation.

II. Scope and Sequence

The amount of information covered and explored will depend upon the facilities available in the camp or school and the time available. These water safety suggestions are given for topics that are felt to be important and interesting to children.

During any one outdoor or indoor educational water safety experience, a major emphasis is usually given to one facet of water safety. On the other hand, there are many good reasons for allowing children the opportunity to experience other facets of instruction as they relate to the main topic.

Due to the dangers involved, any instruction actually given on or in the water should be supervised by a qualified and experienced water safety instructor. However, many of these activities can be done without the necessity of water or large amounts of water by the classroom teacher.

A. Overview

B. Rescue and First Aid
   1. Supervision and Safety
   2. Swimming
   3. Canoeing
   4. Ice
   5. Artificial Respiration

C. Swimming
   1. Supervision and Safety
   2. Skills
      a. Safety (all)
      b. Beginners
      c. Non-beginners
   3. Games

D. Canoeing
   1. Supervision and Safety
   2. Skills
      a. Safety
      b. Basic Strokes
   3. Games

III. Background Information

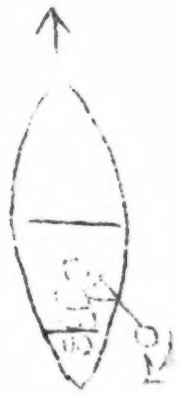
A. Overview

Since a large part of our world is covered with water, and since most of us will cross and/or have occasion to enter a body of water at various times, the wise course of action would be to learn either to tolerate or enjoy and survive in this portion of our environment. The conservation and preservation of human life depends upon a knowledge and understanding that the potential for hazards and accidents exists regardless of the environment, and that water safety requires forethought and practice.

Success in swimming and boating is dependent upon efficient a accommodation to and utilization of the characteristics of the watery environment and physical laws. Some of these are:

1. Water is supportive.

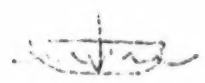
An object will sink into water until the weight of the volume of water it displaces is equal to the weight of the object. Increase the volume of the object (as by taking a deep breath) while holding weight constant and the object will float higher. Decreasing the weight of a given volume will also cause it to float higher (as by taking out extra weight from a canoe).



2. Water has resistance to compression and movement through it.

Propulsion is possible because for every movement in the water, there is an equal and opposite propulsive reaction. If friction can be reduced in movement, greater speed and/or greater efficiency is gained.

3. Gravity continues to operate upon objects in or on the water.



center of gravity

During boating or swimming, the effects of gravity must be countered and reckoned with. The total weight of an object hypothetically centers and can rotate about one spot called that object's <u>center of gravity</u>.

4. Leverage principles are in operation in water activities.

The longer the force lever arm acting through the center of the rotation (fulcrum) and the greater the weight or force applied, the greater will be the tongue or rotary action. (example: canoeists stay as low as possible in a canoe).

B. Rescue and First Aid

1. Supervision and Safety

a. The class can be broken down into groups of two that can take turns rescueing each other by the various elementary methods.

b. Canoe stability and swamping activities can be handled by an instructor in chest high water with a maximum of three students per turn in a canoe wearing life jackets.

c. Give students an opportunity to swim in a life jacket before the canoeing experiences, if possible. Have sufficient Resusi-Bottles constructed to allow each student to have one. The Resusi-Bottle should be cleansed with alcohol after or between uses.

2. Swimming

   a. A swimmer in trouble "looks different" from those in play about him.

   b. Reach something to a troubled swimmer rather than swimming out.

   c. Use simple reaches of the body or extend the reach with pole, towel or rope.

   d. Self-rescue can be accomplished by floating in deep water, rebounding from the bottom, and survival floating (drown-proofing).

   e. Muscle cramps can be released by stretching and rubbing of the muscle.

3. Canoeing

   a. A swamped (water-filled) canoe will float even with several persons sitting inside.

   b. Help and rescue will be more certain if you stay with your overturned canoe.

   c. You can enter a swamped canoe by placing hands on the bottom and flutter kicking inside.

   d. In fast, rocky streams swim behind your swamped canoe and guide it to shore from the rear.

4. Ice

   a. Cold water rescue must be done quickly.

   b. Cold water quickly numbs and weakens.

   c. If alone, flutter kick vigorously and pull self onto firm ice.

   d. When attempting an ice rescue of others, lay flat on ice and extend a pole, plank or rope.

5. Artificial Respiration

   a. Mouth to mouth artificial respiration can best be practiced on a Resusi-Bottle.

   b. When breathing stops the bluish skin color of the ears, eye lids and under finger nails is a prominent indication of oxygen starvation.

   c. Do not waste time - seconds count.

d. Place patient on back; lift neck and tilt head all the way back. Make a clear airway.

e. Pinch nose and blow vigorously into patient's mouth to make the chest expand. Do not recommend use of thumb in patient's mouth; especially by children.

f. Inflate 10 full times in rapid order and then settle down to a comfortable rhythm.

g. If chest does not expand, check in mouth for obstructions.

h. Call rescue squad or doctor as soon as possible.

C. Swimming

1. Supervision and Safety

a. There should be a minimum of one instructor for each ten students.

b. Instructors should position themselves to allow visual supervision of their entire group, even when assisting one individual.

c. Be aware of the fatigue factor in cold water, especially of non-beginners.

d. Review with students the requirements for safe swimming areas to include a tour of the facility being used.

e. Beginning swimmers must begiven a specific safe swimming area roped off from deep water.

f. Have some reaching poles handy and in view.

2. Skills

a. Safety (all)

Review, teach and practice floating, breath holding, treading rebounding, drownproofing, life jacket use and elementary reaching rescues.

b. Beginners

(1) Adjustment to the water.
(2) Getting face wet, blowing bubbles, bobbing.
(3) Learn to float: prone, jelly-fish, turtle, supine.
(4) Gliding: prone and supine.
(5) Gliding with kicks: prone and supine.
(6) Beginning arm strokes: human, arm over arm, finning.
(7) Turning over and change of direction.
(8) Treading water.
(9) Diving: sitting, kneeling, standing.
(10) Swimming: human stroke and beginner arm over arm.

c. Non-Beginners

(1) review basic strokes and activities.

(2) teach and/or review breaststroke and elementary backstroke.

(3) teach diving: front and back.

3. Games

a. Tag games

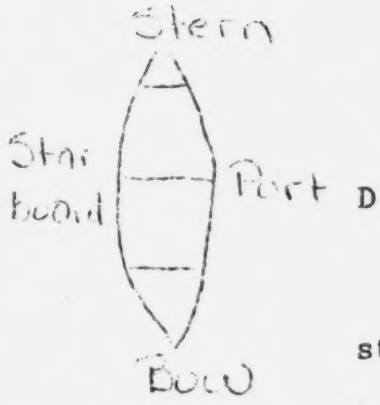
Many kinds of tag games can be devised for the ability of a group of students at any given session. The game structure might be loose or organized into a circle or a line. Tagging could be done with the hand or with a soft object (plastic ball, stuffed stocking). Escapees might be allowed to run, swim or only duck under water. All players might be given a life jacket to wear.

b. Object retreiving

The retreival of an object can be played in water depth that will meet the needs of the students. The object may be a sinker or a floater. "Spud" is an example of an object retrieval in a tag game.

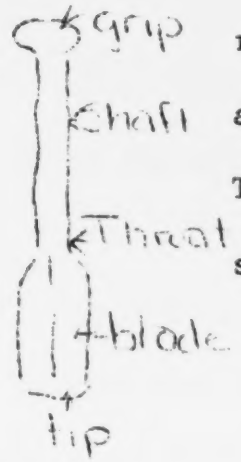
c. Skill contests.

Any of the swimming or diving skills can be used in formal contests. Examples are: glide for distance, breath holding, diving and swim or kick races. Contests involving swimming underwater for distance are dangerous and should be avoided.



D. Canoeing

The canoe is perhaps the best small boat in which to have students experience and learn the art of safe, small craft handling. After his first experiences, the student begins to realize the effects that wind, waves, load, trim, paddle actions, and hull form have on the successful control of a small boat. Taking no great strength to maneuver in calm water, even young students can be successful.



1. Supervision and safety

   a. A safe enjoyable canoeing experience is dependent upon due consideration of and readiness for the season of the year, the weather expected and at hand, the skill and knowledge of the paddlers, and the equipment being used and carried. (Note: canoeing can be done comfortably in the rain. Students bring raincoat and hat)

   b. For the first experiences of beginning paddlers, it is recommended that the water area being used be small and confined. It should be protected from large waves, wind and strong currents.

   c. The high point of any canoeing session is the extended cruise. It is recommended that student cruises stay along shore lines and avoid crossing open bodies of water for any distance because young paddlers cannot handle a canoe in high winds often experienced on open bodies of water.

d. Life jackets (properly secured) must be worn at all times by students in canoes. The adult size jacket is recommended. The maximum load for a 15', 16' or 17' canoe is three students.

e. The safe equipment for a canoe is:

(1) Bow and stern lines (painters).

(2) Bailer (example: cut-down chlorox bottle).

(3) Spare paddle

(4) Life jacket for every paddler (including adults).

(5) A whistle for signaling.

(6) A first aid - emergency kit in one or more canoes in the group.

f. The safe embarking procedures are:

(1) Place canoe fully in water with only one end touching shore.

(2) One person enters canoe while other holds it.

(3) Stay low, walk on center line, hold gunwales. Do not stand up while entering a canoe.

(4) Last paddler to enter pushes off shore in scooter position.

g. The safe tandum paddling techniques are:

(1) Lower the center of gravity of the load in a canoe in rough weather or water conditions.

(2) Paddlers should assume kneeling positions or sit and hook one leg under seat to increase stability.

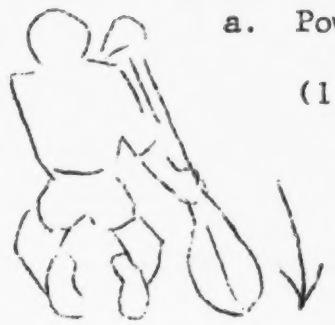
(3) Keep paddles on opposite side of canoe.

(4) Keep body weight inside the plane of the gunwales.

(5) Change paddling positions on shore, not on the water.

(6) Rotate the canoe by the two paddlers applying force in opposing directions, not by paddling on the same side.

2. Basic Canoe Strokes



a. Power strokes involve the moving of the paddle.

(1) Efficient paddling involves the wise use of leverage principles. Keep the hands spread wide apart and the lower arm fairly straight throughout the power phase of a stroke. The lower hand which grips the throat of a paddle is a moving fulcrum. The upper hand (which must be pronated) is the point through which power is applied. Power strokes cause the canoe to move opposite to the direction of the power applied.

(2) Bow stroke - pull to rear, close and parallel to the gunwale.

(3) Sweep stroke - a wide pull to rear.

(4) Reverse sweep - a wide push to front.

(5) Backwater - push forward, close and parallel to the gunwale.

b. Steering strokes require a stationary paddle.

(1) Either the canoe or the water must be moving for steering strokes to be effective. Steering strokes cause the canoe to be drawn toward the side on which the paddle is held.

(2) Stern rudder - the student in the back of the canoe holds the paddle so the blade is at a 45° angle to tthe rear of the canoe and held so the inside edge of the blade is tilted up and outward.

(3) Bow rudder - the student in the front holds the paddle so the blade is at a 45° angle to the front of the canoe and held so the inside edge is tilted down.

c. Braking strokes cause the canoe to slow or stop when force is applied in the opposite direction of travel.

(1) Holdwater - both paddlers hold paddles at right angle to the canoe with the inside edge of the blade down and the flat surface held rigid to the force of the water running into it.

(2) Backwater - push forward, close and parallel to the gunwale to stop forward travel more quickly than possible with the "holdwater".

3. Canoeing Games

a. Students are allowed to dodge in; maneuver their canoe anywhere within a confined area, but they may not touch any other canoe with their canoe or paddle. Various penalties can be devised. This game is particularly effective for emphasizing maneuvering instead of speed.

b. Follow the Leader

A course is marked out or indicated that will emphasize the skills being taught which the students must follow. A circular course will allow efficient repetition of the course. This game or activity is a good beginning procedure.

c. Canoe Races

A variety of canoe races can be devised to enhance the students' efficiency in canoes. Examples are: straight ahead speed, backward race, hand paddle, stamped canoe and overland races.

IV. Pre-camp Activities

A. Rescue and First Aid

1. Show films - Breath of Life or That They May Live on artificial respiration.

2. Construct a "Resusi-Bottle" and practice mouth to mouth artificial respiration. A face is first drawn on a bleach bottle with the neck of the bottle serving as the neck of the human face. Cut open the mouth hole (not too large) and puncture nostril holes. Attach a 12 inch wide plastic bag (comes on roll) around the neck to represent human lungs. A small book weight (Reader's Digest) will act as the weight of bone and muscle tissue.

3. Study the human respiratory and circulatory systems.

B. Swimming

1. Show film Teaching Johnny to Swim.

2. Practice breath holding and bubbing in individual pails of water.

3. Conduct experiments which will demonstrate the properties and characteristics of water and gravity.

C. Canoeing

1. Make a model canoe and paddle with labeled parts which might be used later in a post-camp display.

2. Conduct experiments with leverage and center of gravity.

V. Camp Activities

A. Rescue and First Aid

1. Simple reaching rescues in shallow water or on land.

2. Practice mouth to mouth artificial respiration of the Resusi-Bottle.

3. Practice release of muscle cramp.

B. Swimming

1. Swim in shallow and deep water in life jacket.

2. Recreational swim period each suitable day if practical.

3. Practice swimming skills.

C. Canoeing

1. Coordinate hand paddling of canoe

2. Stabilize and enter a swamped canoe

3. Hand paddle a swamped canoe

4. Tandum paddling and maneuvering of canoe

5. Early morning canoe trip

VI. Post-camp Activities

A. Rescue and First Aid

1. Use Resusi-Bottle to teach other classes, family and neighbors artificial respiration.

2. Take a junior life-saving course.

3. Sponsor a pre-summer safety clinic in school.

B. Swimming

1. Organize a learn-to-swim program at a nearby pool utilizing volunteer instructors from the community.

2. Have a swim party.

C. Canoeing

1. Rent canoes for a field trip along the Chesapeake and Ohio Canal.

2. Contact a local canoe or boat club for a demonstration, perhaps in a pre-summer safety clinic.

VII. Bibliography

A. Books and Pamphlets

1. American Association for Health, Physical Education and Recreation, "The Swimming Teacher's Notebook", A.A.H.P.E.R. Journal, 34; 27-44 (May, 1963)

2. American Red Cross, Basic Canoeing, 63 pp, 1963. $.35. A condensed and well illustrated pamphlet for beginners.

3. American National Red Cross, Swimming and Water Safety, 142 pp, 1968, $1.00. A modern, up-to-date text. Fine illustrations.

   A collection of ideas, techniques and principles from well known authorities centered around school instruction.

4. Buck Ridge Ski Club, Basic River Canoeing, 70 pp, 1968. $1.25. 32 Dartmount Circle Swarthmore, Pennsylvania 19081.

   An excellent A-Z primer for any river canoeist. The stresses are upon Safety, equipment, and technique.

5. Corbett, Roger and Louis Matacia, Blue Ridge Voyages, Volumes I and II, 1966. $1.75 and $2.00. 7414 Leesburg Pike, Falls Church, Virginia 22043.

   Small pamphlet guide books with favorite canoe trips in the greater Washington area. Very good. Maps included.

B. Films

American National Red Cross

1. Teaching Johnny to Swim
2. Oars and Paddles
3. That They May Live
4. Breath of Life

C. Canoe Rentals

Fletcher's Boat House, 4940 Canal Road, phone WO 6-9677.
Thompson Boat Center, Rock Creek Parkway, Virginia Avenue, N. W., phone Fe 3-9711.
Jack's Boats, 3500 K Street, N. W., phone Fe 7-9642.
River Bend Camp, Great Falls, Virginia, phone 759-9672.

D. Canoe Clubs

Canoe Cruisers Association, Washington, D. C., phone 474-5056.
Blue Ridge Voyageurs, Falls Church, Virginia, phone 534-7032.

OUTLINE FOR CAMPFIRE PROGRAMS

I. Purposes . . . . . p. 1

II. Scope and Sequence . . . . . p. 1

III. Background Information . . . . . p. 2

A. Songs . . . . . p. 2

B. Myths of the Constellations . . . . . p. 2

C. Folk Literature . . . . . p. 4

D. Indian Dances and Steps . . . . . p. 5

E. Skits, Stunts and Games . . . . . p. 6

IV. Pre-camp Activities . . . . . p. 10

V. Camp Activities . . . . . p. 11

VI. Post-camp Activities . . . . . p. 11

VII. Bibliography . . . . . p. 11

I. Purposes

A. To transmit an atmosphere of human warmth and good fellowship.

B. To develop the understanding that, since prehistoric days, the campfire has been a traditional center for human activities, thus this attempt to recreate this age old magic and its adaptation to modern life.

C. To help children enjoy and appreciate some of the songs, stories poems, games etc. that are so much a part of their American heritage.

D. To afford an opportunity for students to dramatize learnings gained from other areas of their camping experiences.

E. To afford an opportunity to demonstrate and share each student's talent, interest and understanding with others.

II. Scope and Sequence

A. Preparation for campfire

1. Students can be designated in the classroom or in Camp Crafts to build the campfire.

2. Materials for the campfire program should be organized prior to camping experience.

(a) Costumes
(b) Props
(c) Written materials (use what is suggested here or the students may choose to write their own)

B. Presentation of program

1. Each student should have some part.

2. Program should be balanced and provide a variety of experiences.

3. Program should be student-centered.

III. Background Information

A. Songs

1. Folk and popular ballads that have strong appeal to the campers

(a) Music teacher in your school will teach some

(b) Children will teach others the songs they know

2. Titles of some songs familiar to children

(a) Clementine
(b) Blue-tail Fly
(c) Erie Canal
(d) Down in the Valley
(e) There Was An Old Lady
(f) This Old Man
(g) She'll Be Comin' Round the Mountain
(h) Bingo
(i) Reuben and Rachel
(j) Buffalo Gal
(k) Do Your Ears Hang Low?
(l) In a Cabin
(m) Kum-By- Ya

B. Myths of the Constellations

1. Big and Little Dippers (Greek Version)

These are the names of two groups of stars seen in the northern sky. Both groups form the outlines of long handled cups.

The Big Dipper forms part of a larger constellation, Ursa Major or the Great Bear. The Little Dipper forms almost the entire constellation Ursa Minor or the Little Bear.

According to Greek mythology, Ursa Major is the nymph Callisto and Ursa Minor is her son Arcas. Zeus loved Callisto and this angered his wife, Hera. When Hera tried to kill her, Zeus changed Callisto into a bear. Arcas did not know the bear was his mother, and tried to kill it. So Zeus changed Arcas into a bear, and put them both into the sky to save them from harm. It is said that the tail of the bears were stretched because Zeus pulled them into the sky.

2. Scorpion - Summer

Scorpion is a constellation that appears in the South when the stars come out in the summer. The scorpion was placed among the stars in the sky so he could never again get into trouble. This happened after he stung Orion on the heel and killed him.

3. Orion - Winter

Orion was the son of Neptune, god of the sea. He was a very handsome giant and a mighty hunter. His father, god of the sea, gave him the power of wading through the depths of the sea, or as others say, of walking on its surface.

Orion fell in love with Merope, the daughter of Enopion, king of Chios, and wanted to marry her. He cleared the island of Chios of all its wild beasts, and brought them back as presents to his beloved, but her father still refused to allow them to get married. So Orion tried to gain possession of the maiden, Merope, by violence.

Merope's father was so angry with Orion that he blinded him and threw him out on the seashore. The blinded hero, Orion, then followed the sound of a Cyclop's hammer till he reached Lemnos, and came to the forge of Vulcan. Vulcan pitied him and gave him a guide named Kedalion who guided him to the abode of the sun. Placing Kedalion on his shoulders, Orion started to the east, and there he met the sun - god who restored his sight with a sun bearm.

After this he lived as a hunter with Diana (goddess of the moon, hunting and nature), with whom he was a favorite, and it is even said she was about to marry him. Her brother, Apollo, did not like this so one day when he saw Orion wading far out in the sea with his head just above water he pointed it out to her and asked her if she could hit that "black thing" on the sea. Diana, being an archer-goddess shot an arrow with fatal aim. The waves rolled Orion's dead body to land - when Diana saw the horrible thing she had done she placed him among the stars, where he appears as a giant, with a sword, girdle, lion's skin and club. Sirius, his dog, follows him. Three bright stars form his belt, from which hangs a sword. Two bright stars mark his shoulders and his legs.

4. Leo - The Lion - Spring

With the coming of spring the constellation Leo is seen in the eastern sky. "Leo" means lion. The constellation represents the lion that was killed by the famous Greek hero, Hercules.

Stars forming a sickle outline the head of Leo - the lion, and a triangle of stars make up the hind quarters and tail.

5. Sagittarius - Fall

Sagittarius is a southern constellation, partly in the Milky Way, representing an archer who is a centaur called Chiron.

Chiron was a wise kind centaur who was very fond of children. Though he looked like other centaurs, half horse and half man, he wasn't related to them at all. He became famous as the greatest teacher in Greece. Many kings brought their sons to him so he could raise them in the true spirit of heroes. In his quiet cave, he taught them manly sports and how to use the healing herbs of the earth and how to read the stars in the sky. All his pupils returned to their homes exceeding their fathers in both courage and knowledge.

After his untimely death he was placed among the stars by Jupiter. In the Milky Way he represents an archer.

C. Folk Literature

1. Hal Borland's- Rocky Mountain Tipi Tales
2. Richard Chase's- Grandfather Tales
3. Richard Chase's- Jack Tales
4. E. Pauline Johnson's- Legends of Vancouver
5. Rudyard Kipling's- Just So Stories
6. Frank E. Linderman's- Indian Old Man Stories
7. Arthur Parker's- Skunny Wundy Stories & Rumbling Wings
8. Mabel Power's- Stories the Iroquois Tell Their Children and Around an Iroquois Story Fire
9. Theodore Ressler's- Treasury of American Indian Tales
10. Ernest Thompson Seton's- Trail and Campfire Stories, Woodland Tales and Woodmyth and Fable
11. Additional material will be found in your school library. Books will have a 398 number.

D. Indian Dances and Steps

1. The March Step

Movement varies in tempo and stride. At times it is a fast walk. Again the steps may be short and a sort of shuffle, as in the dance step of the bear. In the bear step, the body sways as a bear does when walking upright. The drum beat is in march time.

2. The Toe and Heel Step

Done in double beat (loud then soft beat characteristic of Indian drumming). The toe is brought forth of the heel and lowered with a snap.

3. The Heel and Toe Step

Just the opposite to the Toe and Heel. The heel is brought down on the loud beat. The toe follows on the soft beat.

4. The Double Beat Hop Step

Done upon the fore part of the foot. The toes are placed upon the ground on the loud beat and a little hop is done at the soft beat. This step is done alternately with the right and left foot.

5. The Four Beat Step

Done to a heavy beat and three light beats. It follows in quick succession, rhythm sounding something like "ONE, two-three-four". On the first and heavy beat the foot is stamped upon the ground with each successive soft beat the toe taps upon the ground.

6. Other dance steps and postures (Jaeger's - "Council Fires")

1. Backward Scrape Step
2. Pueblo or Southwestern Step
3. Caribou Step
4. Forward Drag Step
5. Woman's Circle Dance Step
6. Horse Dance Step

E. Skits, Stunts and Games

1. The Frog Pond Stunt

Everyone is divided into three groups. The first group says "potatoes - potatoes - potatoes" very fast in high, falsetto voices. The second group says "tomatoes - tomatoes - tomatoes" more slowly in a lower key. The third group repeats very slowly over and over in deep "fried bacon - fried bacon - fried bacon". Resulting sound is very much like a frog pond.

2. Swat - a game played in pairs

Two contestants (blindfolded) get on the ground on hands and knees. Between them is a folded newspaper (the contestants must touch ends with left hands). In their right hands they hold clubs of rolled newspapers. At the word "go" one will ask "Are you there?" The other must reply "Yes". He can move quietly to one side, retaining his hold on the center paper. The other contestant tries to hit his opponent on the head with his club (one swing). If he succeeds, it counts and his opponent asks the question and tries with his club. The best out of three tries is the winner.

3. Shoshone Celebration of the Dog - Stunt

(a) Materials needed:
Bun or roll - head
Loaf of unsliced bread - body
Raisins - eyes
Prune - nose
Red cloth - tongue
Felt or flannel - ears
Carrot - tail
Clothes pins (4) - feet
Feathers
Tray filled with popcorn, peanuts, raisins, candy

(b) Prepare bread and roll so objects may be inserted easily.

(c) At campfire:

Each dancer carries portion of dog's anatomy (in both hands - upraised) as he enters the council ring in single file, preceded by drummers beating march time on a tom-tom. They march in the following order - drummer, "head" with clothes pin neck, body with four clothes pin legs, eyes, nose, ears, tail, feathers. Dancer with the tray brings up the rear. March once around the circle using Indian step.

Body and head are assembled. All but leader are seated, he says "We are gathered here to dance the dog dance in honor of our dear dog who crossed the great divide.

Eyes dancer cones forward and says "Dear dog, when you were with us in the tepee, you were our faithful watchman. I wish to give you back your eyes. (Put raisins in eye sockets of roll.) I dance and feast in your honor tonight." He dances around briefly, turns his face upward, howls a long dog howl, and turns around three times. He then sits down and the nose bearer comes forward and says "Dear dog, whenever we went hunting, it was your sharp nose that followed the game and made the chase a success. I give you back your nose. (Puts prune for nose.) "I will dance and feast in your honor tonight." He dances like the first.

The ear bearer goes through the same process, praising the ears that heard approaching danger and then puts in the ears with a similar performance.

The tail bearer says "Dear old dog, when you were with us, you were our playmate. You were never cross with us. You always met us with a joyful wag of your tail. I give you back your tail (sticks carrot in for tail). I dance and sing in your honor tonight." He dances as others have done.

Each dancer with feathers recalls some good deed the dog did. (ex. - found papoose in woods, etc.) "I stick a feather in your crown and dance and feast in your honor tonight."

Then the leader take it up and says "Yes, dog. You did all of this, you warned us of coming enemies, you found a lost papoose, you made hunting a success. You were a true and trusty friend and in return all you asked for was a bite to eat and a place to lie down. We hope that sometime we can live our lives with you in the Hallo Hunting Grounds, where the white man, the small pox and the mosquito are unknown. Dog - we feast in your honor."

The tray is passed and each gets a share. Before eating all together say, "Dog, in your honor." They all utter a long howl. After eating they howl again, the leader picks up the dog and all dancers leave silently with Indian step.

4. Bear Hunt - activity

This is an activity where the leader tells the story one line at a time and the students repeat each line after him. While the story is being told all participants pat their hands to their knees to imitate foot movements of the hunter. (fast when running, slow when climbing, etc.) They also use their arms (closing door, swimming, climbing, etc.) and facial expression to convey mood. (Start by patting your hands alternately on your knees - do this anytime there is no other activity.)

Want to go on a bear hunt? (Students repeat each line)
Get your hat.
Get your coat.
Get your gun.
Ready now. Let's go.
Close the door.
Across the yard.
Over the fence.
Down the other side.
"Ah - a field!"
Well, I can't go over it.
Can't go under it.
Can't go around it.
Gotta go through it.
Slop, slop, slop, slop ", ", ", ", "
(Use hands to show suction of mud.)
(Continue walking)
Here we are at the river.
Can't go over it.
Can't go under it.
Can't go around it.
Gotta go through it.
Splash, splash, splash, ", ", ", ", "

(Use arms to swim)
(Continue walking)
A tree:
Let's go up and take a look around.
(Climb tree and put hand over your eyes to look around.)
See any bears?
Naw!
Let's go back down.
(Climb out of the tree.)
(Continue walking)
What a hill! (Walk more slowly)
I'm exhausted!
Let's sit down and rest awhile.
(Look around)
Look!
A cave!
Let's go in and take a look around!
Quiet now!
tip toe ....
Oh-h-h-h-h It's dark!
Yah, and it's real cold!
And I'm getting scared.
Want to go any further?
Yah!
O. K.
(Move finger very slowly.)
It's so dark!
And cold!
And now I'm really scared!
(Reach out with your hand and pretend to be feeling something.)
Ah-h-h-h-h That's better . . . . .
It feels so warm.
And it's soft!
And it's furry!!!
And - it has sharp teeth!!!
It's a bear !!!
(Pat hands to knees and go through reverse motions very quickly as though running from the bear.)
Quick - run!
Out of the cave!
Down the hill!
Up the tree.
He's coming.
Down the tree!
Through the river.
Into the mud puddle.
Through the field.

Over the fence.
Into the house.
Shut the door.
Put your gun away.
Hang up your hat.
Hang up your coat.
Sure glad to be home.
Say - did anyone get that bear???

5.. Other Stunts: Scouts, both Boy & Girl, can give additional suggestions.

IV. Pre-camp Activities

A. Familiarize students with purpose of camp fire.

1. Transmits an atmosphere of warmth and fellowship.

2. Develops appreciation of rich American Heritage.

a. Songs
b. Stories
c. Activities

3. Affords an opportunity to share talents, interests, and knowledge with others.

B. Discuss campfires that children have participated in.

C. Set up Camp Fire program with students.

1. Include all students in something.

2. Use a variety of experiences and activities.

D. Collect and organize all materials necessary to conduct program.

1. Written materials

2. Props

3. Costumes, etc.

E. Have students prepare for their part in the program.

1. Song leader - determine songs to be used - learn them.

2. Story tellers - practice story

3. Dancers - choose and practice dance

V 4. Myth teller - learn myth and do illustrations to show

5. Actors in skits - prepare skit - or use ready prepared one - learn lines, parts, etc.

6. Game leaders - prepare games, props, etc.

V. Camp Activities

A. Students build campfire.

1. How - according to knowledge gained in Camp Crafts.

2. Where -

a. Outside in designated area - if weather or season permits.
b. Inside in fireplace - if more desirable.

B. Students present Camp Fire Program:

VI. Post-camp Activities

A. Present Camp Fire Program to another group.

B. Create songs, stories, skits, etc. of your own - make a tape.

C. Make filmstrip using pictures taken during program or illustrations done by students.

VII. Bibliography

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I. Check list under Folk Literature